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founded 1905

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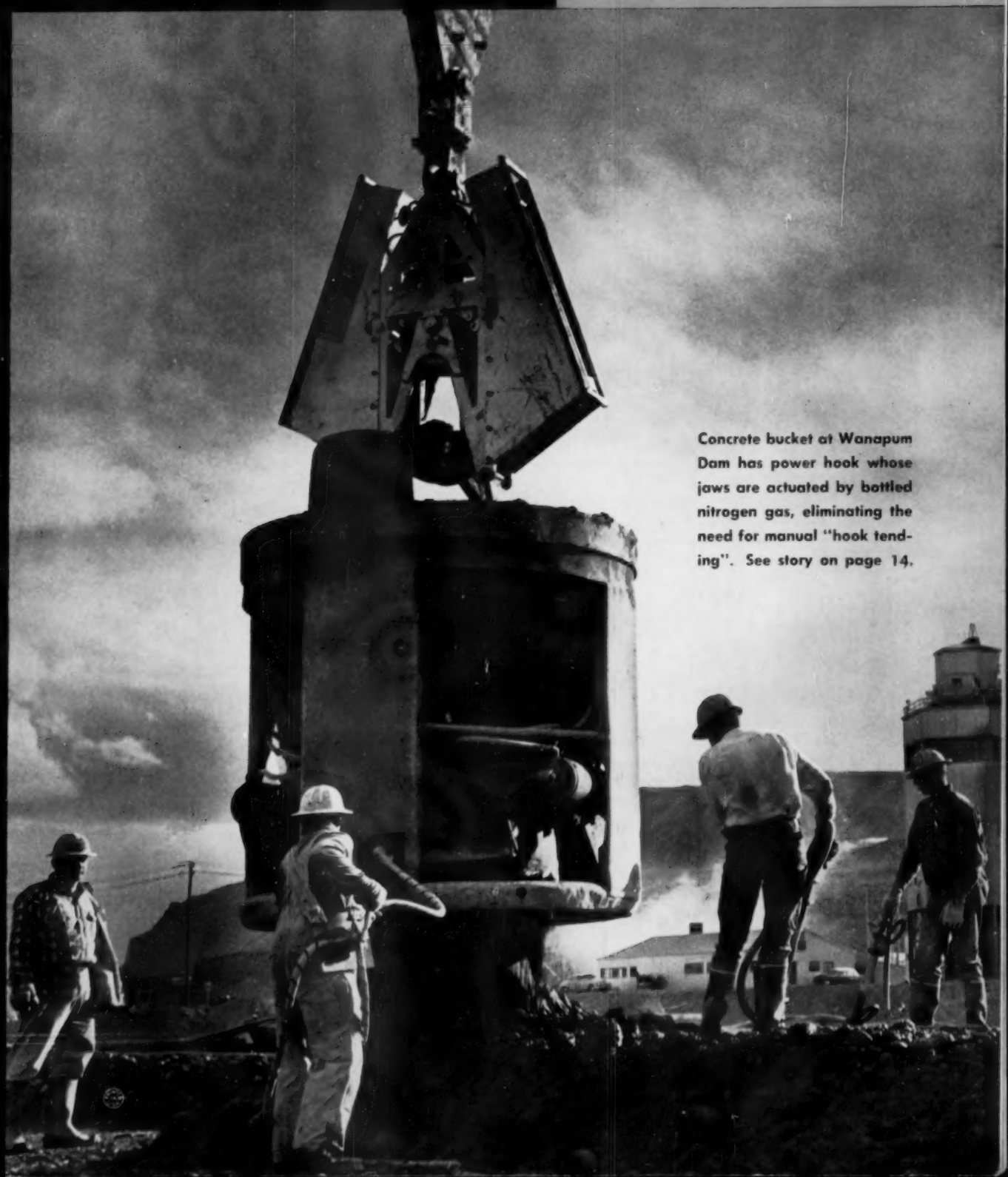
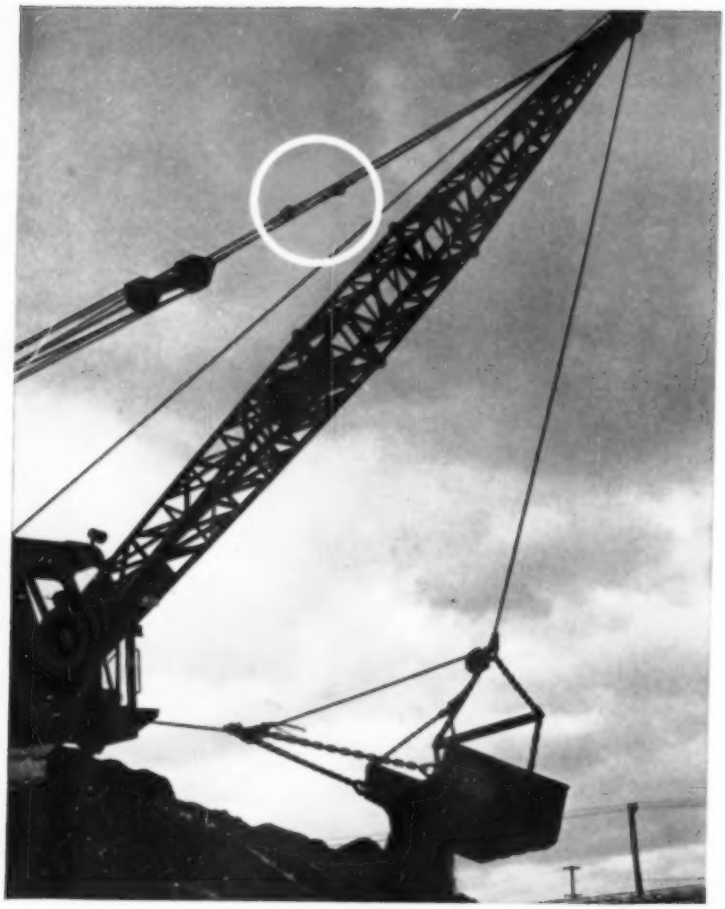


Concrete bucket at Wanapum Dam has power hook whose jaws are actuated by bottled nitrogen gas, eliminating the need for manual "hook tending". See story on page 14.



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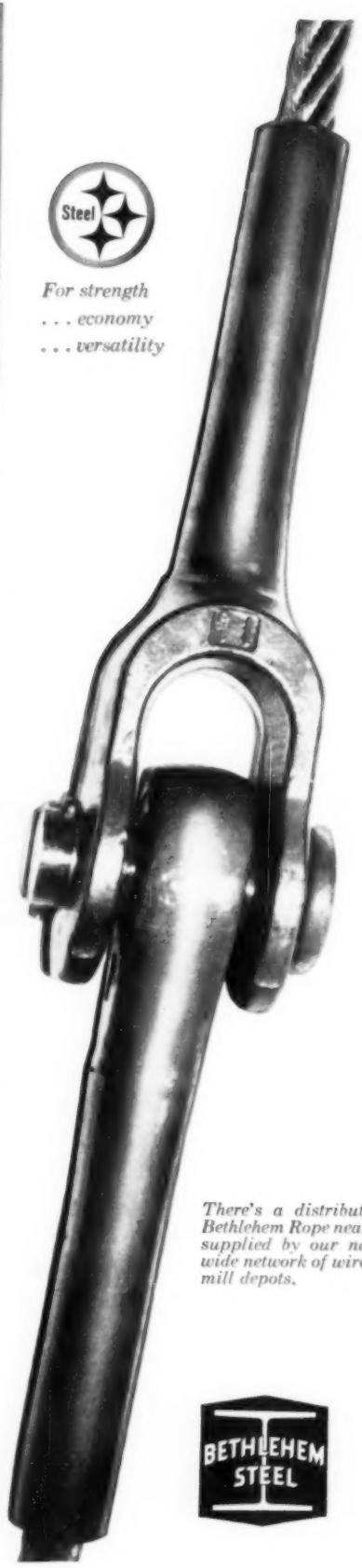

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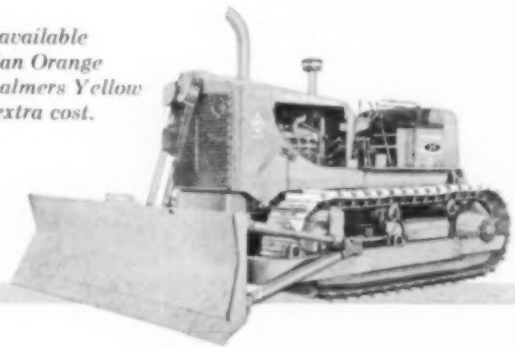

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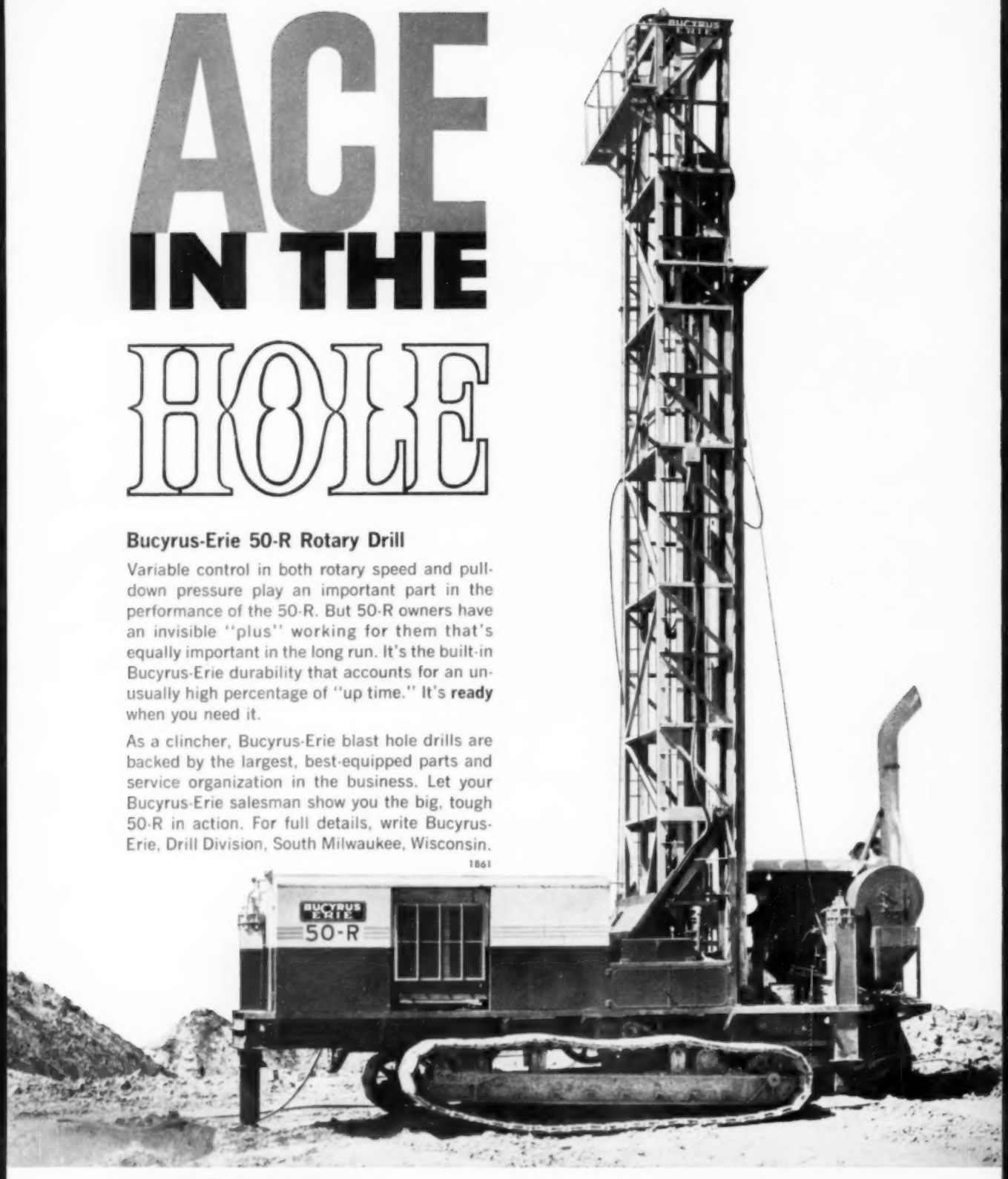
21

ACE IN THE HOLE



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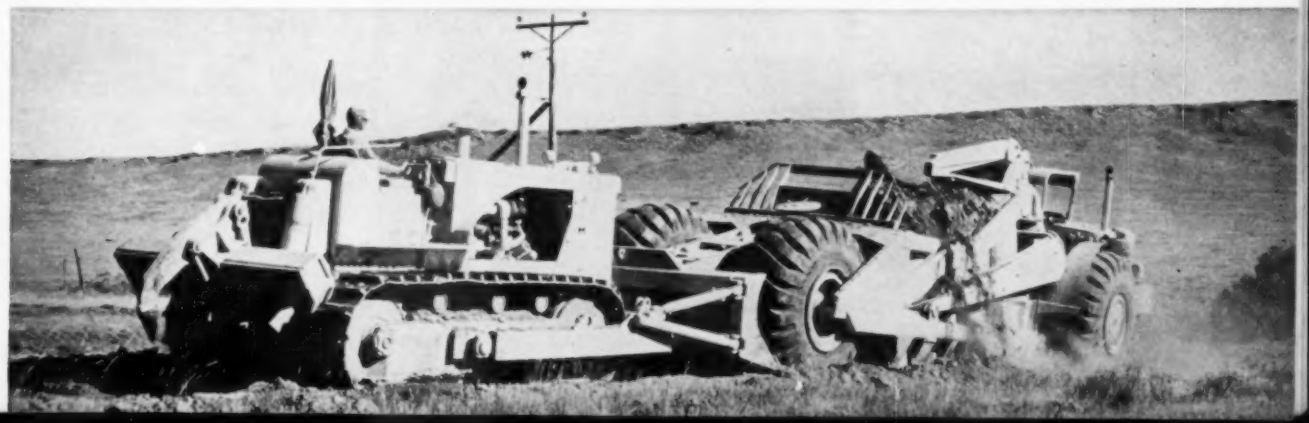

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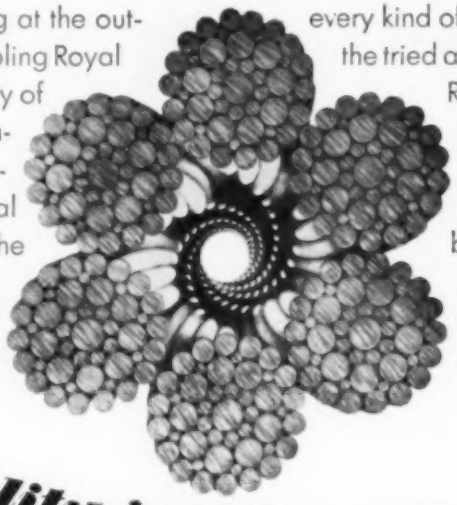

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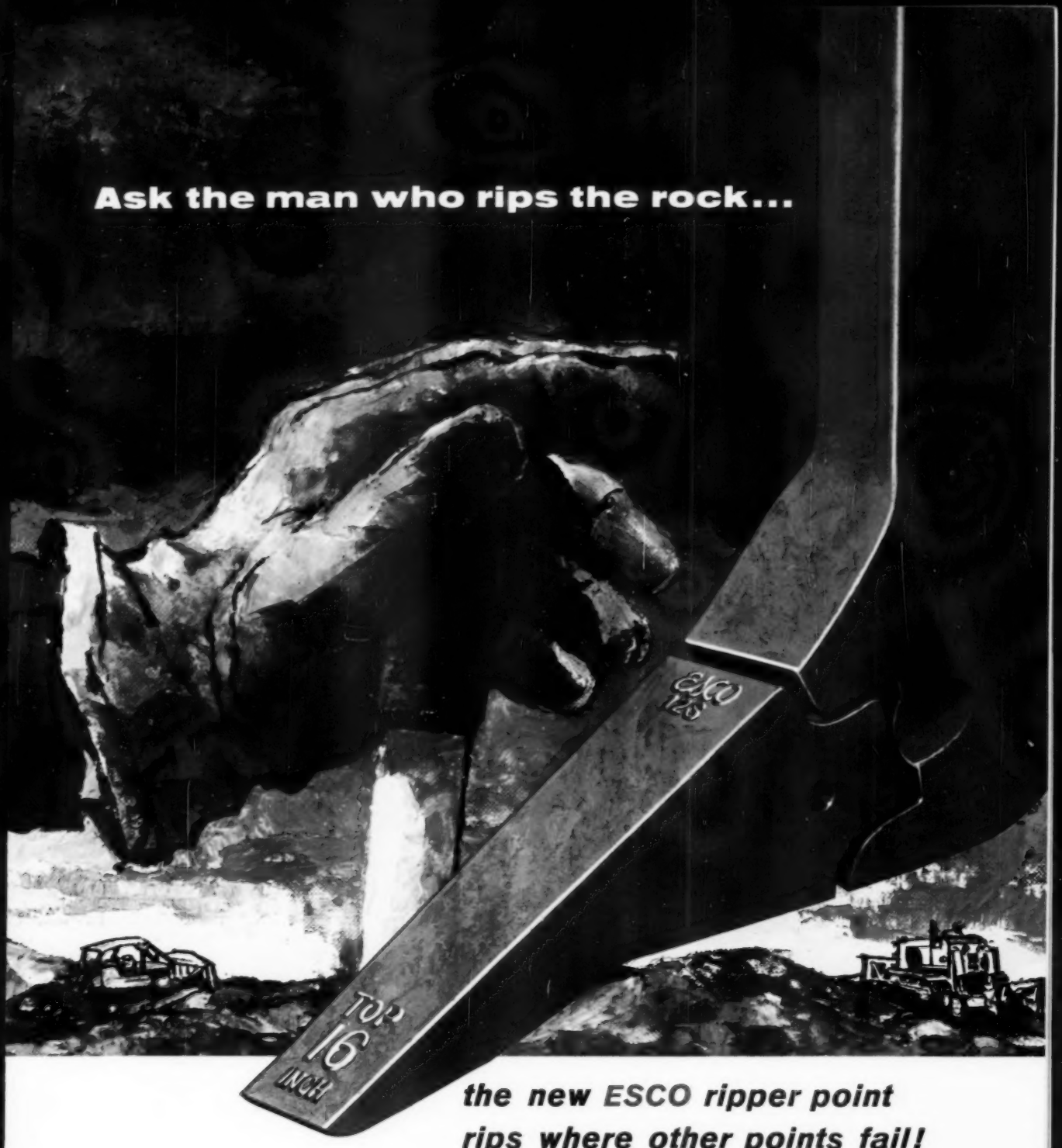

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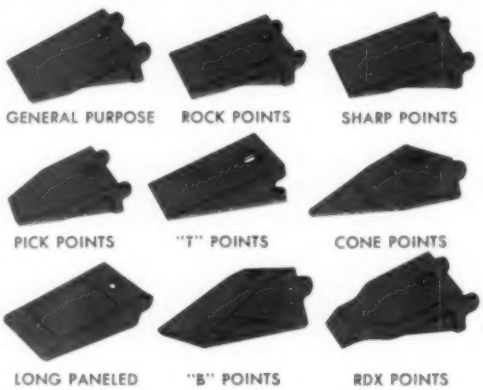

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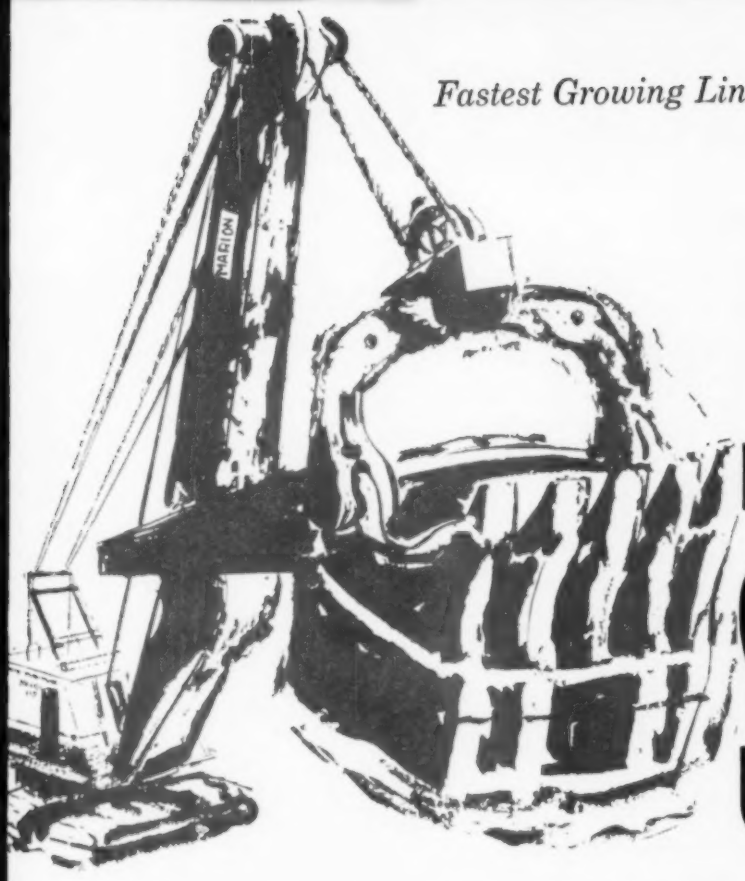

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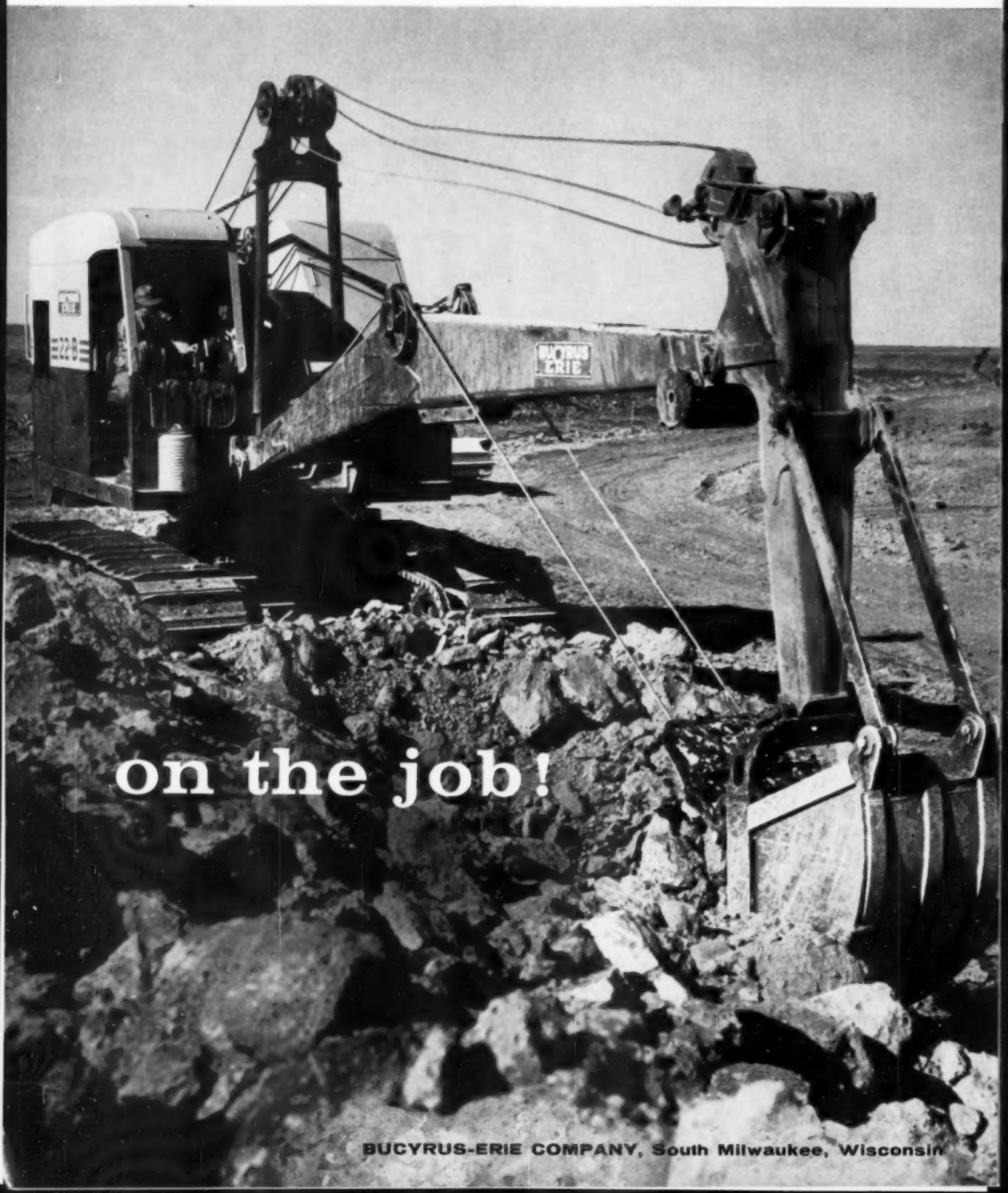

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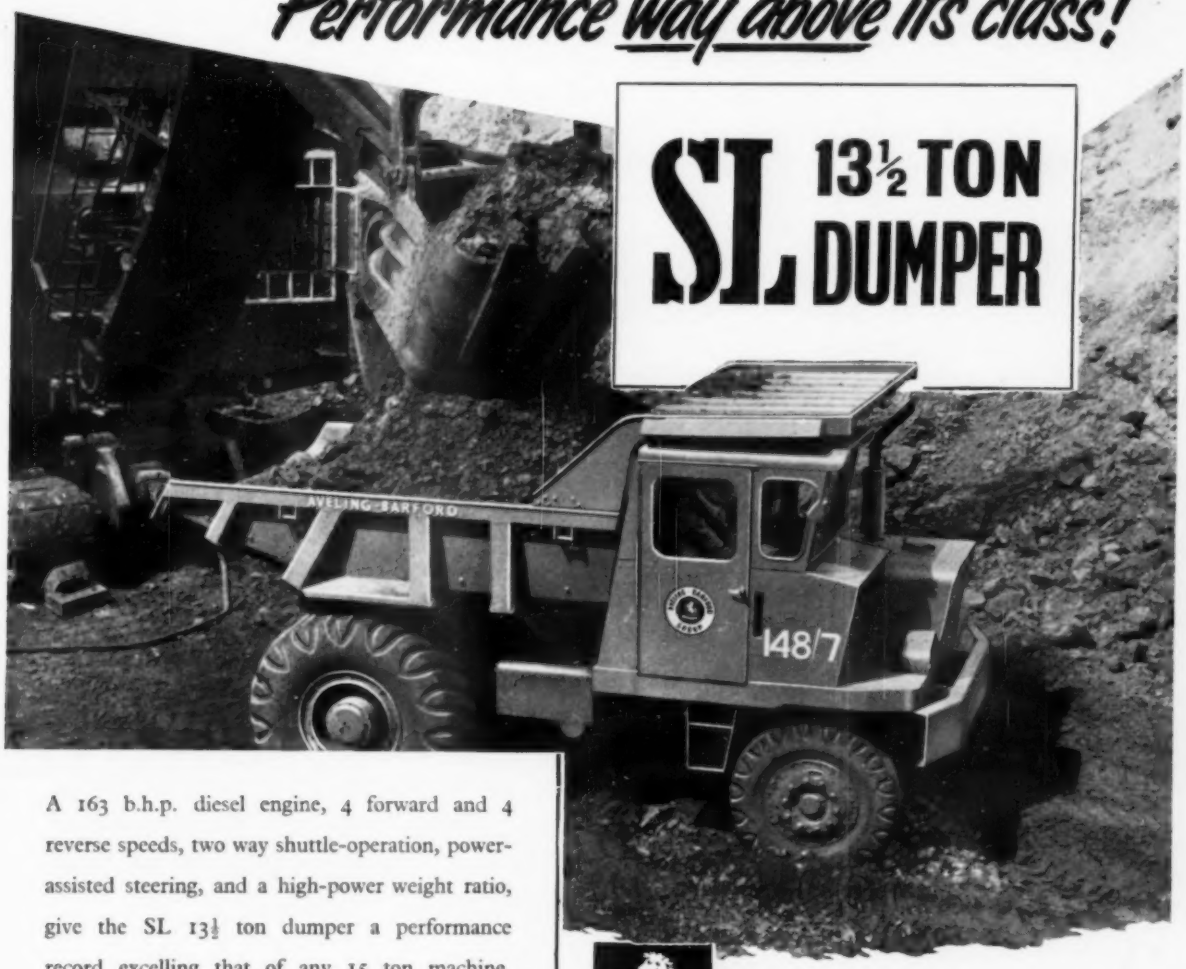

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Wanapum

Modern automation, giant equipment, new excavating method and futuristic concrete techniques speed Columbia River power dam.

Here is the operator's view from cab of the 480-W walker. The 12-yd. Esco bucket looks small as it dumps over 200 feet away into the big 75-yd. transfer hopper.

by Ray Day

WHERE the mighty Columbia pours through basalt cliffs at Vantage, Wash., on its rush to the sea, some of the most advanced dam-building automation techniques the world has ever seen are proving up. Grant County Constructors, a five-firm combine which dared to bid $92,723,315 for work the engineers figured would run $108 million or better, have worked out advanced construction methods for Wanapum Dam. Result—the job is moving fast, ahead of schedule.

The contractors hope to keep it that way. Not only the price differential at bidding time is at stake. The job's a private utility undertaking of Grant County Public Utility District, so speed is important, too. So much so that the contractors can earn a $1,200 a day bonus if they put two generating units on the line by September 1963. They *must* have six powerhouse units on the line by September 1964, and the remaining four by January 1965 or there'll be a $3,000 a day penalty enforced.

Gambling on the outcome of all this is Morrison-Knudsen Co., Inc., acting as project sponsor. Associated venturers include Henry J. Kaiser Co.; Macco Corp.; Raymond International, Inc.; and F&S Contracting Co. All have participated in many a western dam building job over the years. All joined in working out the mechanized advancements in methods.

Harza Engineering Co. of Chicago created Wanapum's design, and is supervising field engineering, inspection, and test work under Grant County PUD officials.

Working from a comfortable position on high ground above the river, the 480-W digs the tailrace channel to make room in the Columbia River floor for water to move away from powerhouse turbines.

Dam's Ingenious Construction

Many of the dams up and down the kilowatt-rich Columbia River have been hacked into a land whose geological problems are staggering in magnitude. Wanapum is no exception. Bedrock is a good basalt, and if it lay close to the surface, construction would be a lot simpler than it is. The trouble centers around the fact that up to 80 feet of porous gravelly material lies over this bedrock in the foundation, with lesser amounts of overlay in the abutments. But it covers the entire 1,200-ft. width of the Columbia at the point where they're building the dam.

It was impossible for the contractors to make a sloping excavation to bedrock and keep it dry. Yet one of the primary design fundamentals was the necessity for placing an impervious wall of material, reaching from bedrock up into the 4,000,000-cu. yd. earthfill portion of the dam.

This peculiar problem left no alternative in the case of 2,920 feet covered by the concrete spillway, powerhouse and fish passage facilities. Concrete works had to set on bedrock, and be keyed there. Harza Engineering chose a design which compromises nicely between all these factors. The dam is Z shaped, with the spillway and powerhouse near the main river channel.

By building 7,000 feet of cofferdam in a U-shape, construction of the spillway and powerhouse could begin at once, holding the river close to its normal channel until relatively late in the job schedule. That would tend to speed construction of the hydroelectric generators. And meanwhile, thanks to a new method for building impervious cores under water, much of the embankment could be finished.

First Year's Progress

How well the geological difficulty was whipped can be summed up this way: in their first construction year, Grant County Constructors built the 7,000-ft. cofferdam around first stage work, got most of the powerhouse and spillway excavation out of the way, and began placing concrete in both the spillway and powerhouse. At the same time, a million cubic yards of the 3,400,000-yd. compacted embankment also were placed.

One of the most ingenious solutions to a problem, since the time some of the same companies froze a sliding abutment when Grand Coulee Dam was built, has been the use of a new slurry method on the impervious core. It allows a watertight curtain of clayey material to be placed without dewatering the area.

Ever hear of a 20-yd. bucket being used to dig a trench? It was done here. A Bucyrus-Erie 480-W dragline, bought especially for heavy digging in the spillway and tailrace areas, has used its big bucket successfully, in conjunction with the slurry method, for cutting the core trench down to solid rock through 80 feet of gravel overburden.

Adoption of this method was practically forced on the contractors. It was impossible to make a sloping cut in the overburden and keep the area dry, without having fantastic expense. So a big-scale method of the type drillers often use in caving sand was adopted.

Slurry equipment consisted of three portable plants, with a mixing capacity totalling 15 barrels per minute. The slurry mixture was simple—1 part bentonite to 12 parts of water. Mixing in the plants was done by wa-

In powerhouse intake channel, a shovel empties broken basalt rock from its 3½-yd. dipper into a Euclid end-dump. Cooling cracks in basalt cause it to fracture in small pieces when shot.

Dragline excavates an 80-ft. deep trench (filled with a bentonite slurry to prevent wall sloughing) that will reach to bedrock and become an impervious cut-off wall for cofferdam. In background is the boom of the 480-W.

ter jets, and the mixed slurry was then pumped through 8-in. pipelines to a 10,000-barrel sump, where it could then be routed to the trench. Because the specific gravity of the slurry is higher than that of ground water, maintenance of a full trench of solution prevented water from pouring into the excavation. Even at bedrock, water was held back. The heavy slurry also preserved the vertical walls.

Digging ahead of the slurry mixture were a Manitowoc 4500 dragline and the 480-W. The ponderous walker, moved back step by step on its digging pads as its bucket opened up a trench 10 feet wide and up to 80 feet deep. As each bucketful was excavated and dumped, a like amount of slurry was pumped in.

To prevent sand dilution of the slurry, it was kept fresh by recirculating it through sumps. Final cleanup of the foundation was handled by an air-lifted pump handled by a 75-ton P&H truck crane.

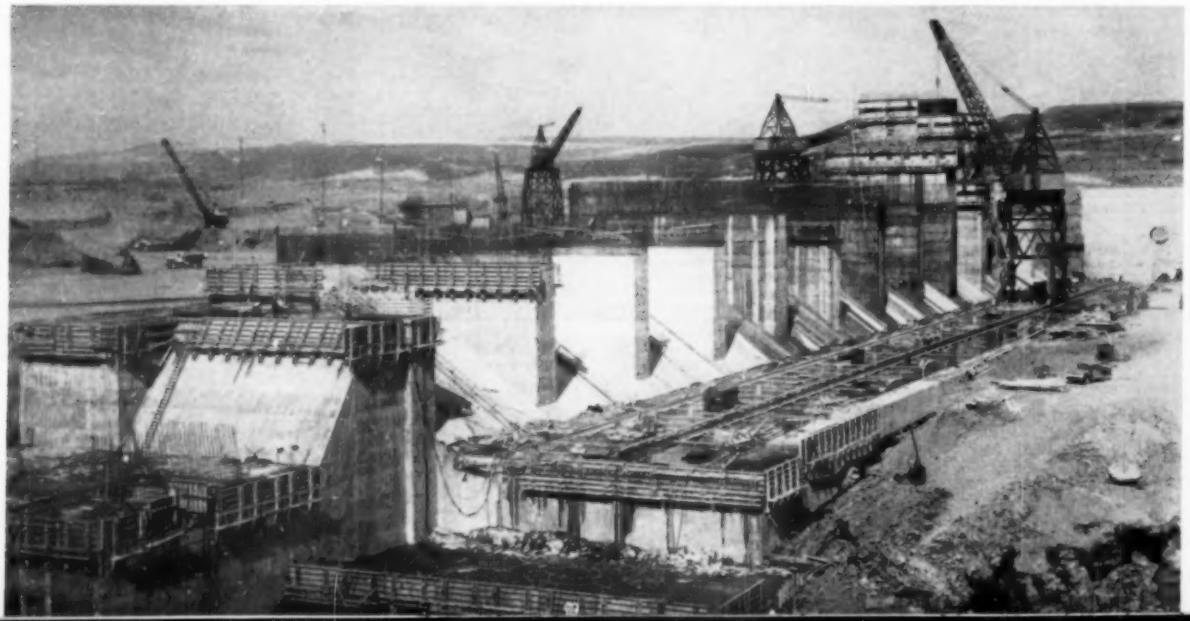
Impervious clay, loaded to Euclid end-dump trucks by a Bucyrus-Erie 71-B shovel, was dumped from the surface, working the dump only a short distance behind the excavation point. Every effort was made to prevent any dilution of the slurry with this material. Final result was a dense, close-knit wall of impervious earth, bolstered on either side by slurry-reinforced overburden. The core wall is being built fast, free of ground water, without excessive excavation, and without having to fight an impossible water pumping problem.

Since it was the first time the method had ever been tried on such an extensive scale, Grant County PUD engineers were anxious to see how effective it had been. They had a chance to check in just a short time, when excavation in nearby areas opened up the vicinity of the core trench. Visual inspection showed the bond between bedrock and clay to be perfect. And the very effectiveness of the impervious wall had been improved on, because the heavy bentonite slurry had penetrated up to 50 feet through the porous gravel on each side of the clay core.

Core trench excavation, however, isn't the big walker's major task. In other parts of the dam—spillway, approach channel and tailrace—millions of cubic yards of material must be dug rapidly and economically. That's where the 480-W plays a starring role.

When the notes for this article were made, for instance, the machine was handling a 17-yd. Esco bucket as it

View of Wanapum spillway shows gantry-mounted Washington cantilever cranes at work. Concrete is delivered in 4-yd. buckets.

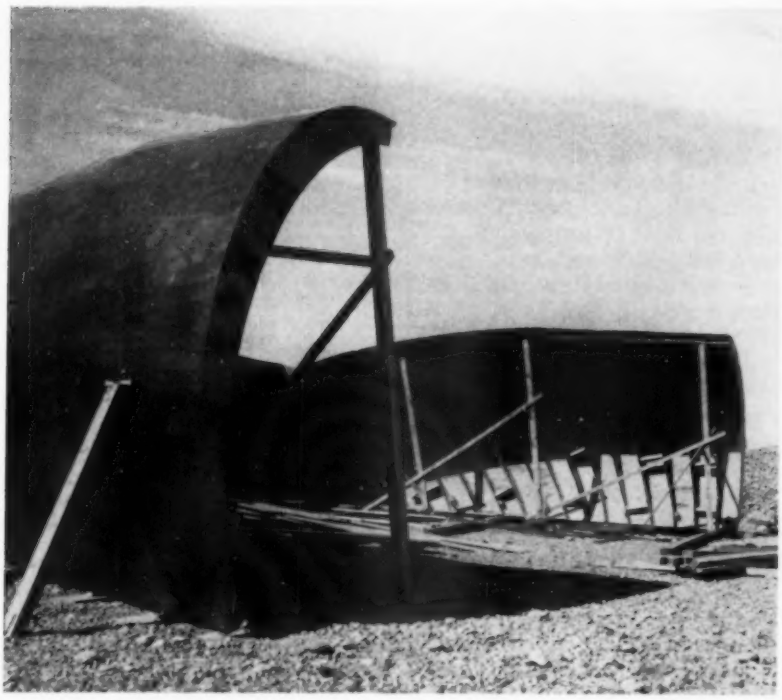


ripped nearly 3,000,000 yards of gravel from the Columbia's bed to form the tailrace channel.

A self-powered, self-propelled, individually operated surge hopper of 75-yd. capacity is being used as a transfer point between the dragline's bucket dump and the beds of Euclid haulers. That reduces the loading shock to the frames of the haulers, and also lets the dragline dig at higher

heavy digging in the approach channel was handled by one of two Manitowoc 5½-yd. machines, while the other was assigned to crane work in concrete placing. Hauling units under these machines include a fleet of eight Euc end-dumps, of 17-yd. capacity.

For years, drilling and powder foremen have dreaded the assignment of cutting neat excavations into the brittle, tough basalt rock typical of this



Made by Blaw-Knox, these draft tube forms represent a new departure in this field. Many man hours of carpenter labor were saved on the job.

productive capacity than it could otherwise do.

Using 250 feet of boom, the 480-W dug the tailrace channel by working from a comfortable position on high ground above the river, reaching out to dredge material 20 feet below water level. Then, swinging not more than 90°, it dumped over the hopper, where grizzly bars removed anything excessively large. Six 30-yd. Euclid bottom-dump units hauled from this point. The tailrace gravel is being used partly in the dam, and part is being wasted.

Excavation from the walker is being supplemented by a Bucyrus-Erie 71-B shovel, and by a Northwest 80-D dragline. These rigs are working chiefly in rock, blasted from the foundation and powerhouse areas. Certain part of the Columbia basin. It was done at many of the other dams up and down the river from Wanapum, but it never was easy. It's not easy now . . . even with 1961 model drilling equipment.

Air Trac Drills

The contractors are using Ingersoll-Rand portable compressors in sizes up to 900-cfm. These machines power the Ingersoll-Rand and Gardner-Denver drills, on Air Trac carriages, which sink the powder holes. The finest tungsten carbide drill bits cut less than 100 feet before they need resharpening. Hole patterns average 5 feet, on staggered centers, and bottom at 2½ to 3-in. diameter. Line drilling on 12-in. centers has been resorted to, in some cases, to shape neat slope lines into this hard basalt. Several types of bits—Timken, Rok-Bits, and Atlas Copco tungsten carbide—have been used.

Hercules Powder Co. and Pacific Powder Co. are supplying the high explosives. In wet places 40 and 60% gelatin is being used; free flowing granular powder is used for drier spots. Broken rock left behind the

(Continued on page 18)

IT DOES TAKE EQUIPMENT

CONTRACTORS who bid a present-day dam, hoping to mechanize the work as much as possible to reduce manpower, face an impressive outlay in machinery investment. Consider this list of equipment currently at Wanapum Dam:

- 6—Euclid 30-yd. bottom-dumps
- 8—Euclid 17-yd. end-dump trucks
- 1—Model 480-W Bucyrus-Erie walking dragline, 20-yd.
- 2—Manitowoc 5½-yd. crane-draglines
- 1—P&H 1½-yd. hoe
- 1—Northwest 80-D shovel
- 1—Bucyrus-Erie 71-B shovel, 3-yd.
- 2—P&H truck cranes
- 1—Lorain truck crane
- 1—Cat 12 motor grader
- 1—Cat 14 motor grader
- 1—75-yd. walking loader bin
- 1—Robbins 17½-in. rotary drill
- 1—American 115-ton electric locomotive
- 3—MRS scrapers
- 7—Cat D8 tractors
- 1—Cat D4 tractor
- 4—Euclid S-12 concrete bucket haulers
- 3—Kenworth concrete bucket haulers
- 4—Washington gantry-mounted cranes
- 6—Chevrolet 4-door sedans
- 1—Ford 4-door sedan
- 21—Ford pickups
- 1—Willys jeep
- 1—GMC Carryall
- 1—Dodge Power Wagon
- 3—Ford 2-ton flatbeds
- 6—Ford 2½-ton flatbeds
- 3—Chevrolet 2-ton flatbeds
- 1—Kenworth grease truck
- 1—International grease truck
- 1—Mack truck-tractor
- 1—LoBoy trailer
- 1—Peerless trailer
- 2—Euclid 5,000-gallon water trucks
- 14—Ingersoll-Rand and Gardner-Denver compressors
- 15—Ingersoll-Rand wagon drills
- 6—Gardner-Denver wagon drills
- 2—International TD-14's
- 1—Hough Payloader
- 27—Gas engine powered pumps, 2 to 8-in.
- 10—Electric powered pumps, 2 to 8-in.
- 7—Electric pumps, 12-in.
- 15—Electric pumps, 16 to 30-in.
- 1—Hughes-Keenan 6-ton crane
- 1—50-ton Southwest roller
- 2—McCoy 2-drum sheepsfoot rollers
- 1—Southwest 2-drum sheepsfoot roller
- 4—Kohler light plants
- 1—Fleco rock rake
- 4—Onan light plants
- 2—Palmer-Lister light plants

What's a PUD?

JUST what does "PUD" mean? The initials stand for "Public Utility District." It's a cooperative thing, backed by authority of the state legislature, and designed for the purpose of generating hydroelectric power for the good of the community. Among other things, it has authority to build power generating facilities, and to sign power supply contracts. In that respect it's not too much different from any city street department, or from any municipally controlled electric utility.

Perhaps the most unique thing about Grant County PUD is that its authority permits this sparsely settled eastern Washington desert county to finance and build a dam so big it promised to surpass the $108 million Glen Canyon project in cost and difficulty. Only razor-sharp contractor bidding, and resulting ingenuity in methods, held costs far below the engineer's estimate.

Here's how Grant County PUD worked in the case of Wanapum Dam:

It signed power supply contracts with nine public and private electric utilities. They'll buy 63½% of the power generated by Wanapum Dam. Grant County PUD will retain the other 36½% for its own market. These power contracts back the 49-year revenue bonds, which were subsequently sold to finance construction of the dam.

Private Financing

No tax money or government appropriations are being used in its construction. There is a possibility, later on, that the Corps of Engineers through government contract may build a navigation lock through the dam.

Wanapum's power, and that of Priest Rapids, will be integrated with the Northwest Power Pool. Priest Rapids Dam, 18 miles downstream from Wanapum, is rapidly nearing completion under another Grant County PUD contract.

Dam Ingenuity . . .

(Continued from page 17)

blasts is then loaded out by the 71-B or the 80-D machine, and trucked to the dam to be used in the pervious fill zone.

One of the most unusual pieces of excavation at Wanapum Dam consists of a drilling solution to an engineering problem. When Harza Engineering designed the dam, engineers made room for quick, low-cost future expansion by drawing ten skeleton turbine bays into the powerhouse. These bays, without powerhouse weight, will be too light to support themselves without tipping when the reservoir load is applied ahead of the dam. Some method had to be devised for tying them down for the time they'll be without turbines.

The solution—78 drilled holes, 17½-in. diameter, with stressed steel wire tendons. The holes were drilled deep into the solid basalt rock, by a Robbins drill rig. A three-part bit was used to cut through the tough rock at good speed, so that two units could be completed per shift.

Four groups of 90 high tensile wires, of ¼-in. size, were then lowered to the bottom of each hole, and the ends were anchored by 20 feet of grout. These wires were furnished by Ryerson Steel Co. When the skeleton bay inverts are completed, the wires will be stressed, anchored and grouted. That will hold the bays down, over the years, as Grant County PUD's market expands enough to justify the ultimate turbine installation. At that time, the weight of the powerhouse will make the bays self supporting.

Concrete production has been scheduled for an ambitious 100,000 yards per month, and so far, the aggregate production plant and the batching facility indicate they can meet this figure.

Subcontractor J. G. Shotwell of Seattle is producing all the aggregate and sand from sources in the river channel near the dam site. This is essentially a screening and washing operation, although some crusher reduction with cone-type units is being done. Finished aggregates are stockpiled in various sizes: ¼-in. (sand), ¾- in., 1½-in., 3-in. and 6-in. These are then transported to the batch plant, where they are correctly proportioned with cement, Pozzolith and air entraining agent.

The batch plant is a full-automatic C. S. Johnson setup, with four 4-yd. Koehring tilting mixers. Six compartments in the plant provide storage for 750 yards of aggregates and sand. Nearby, in an Armco steel building, a complete field laboratory makes periodic samples of concrete being turned out, to keep it uniform and within design limits.

Mixed concrete from the batch plant is being hauled to the point of placement by special concrete trailers made by E. T. Pybus Co. of Wenatchee, Wash. Prime movers are Euclid S-18's and Kenworth 848 units.

Some reduction in size of big cobbles is necessary to make concrete aggregates. Here's a large Pioneer jaw crusher turning out broken rock for large aggregate.

(Above) **Manitowoc crane places concrete in the "gravity wing" of the spillway section. Special trailer, pulled by Euclid S-18 tractor, hauls big buckets.**

(Upper right) **This fully automatic C. S. Johnson batch plant proportions all the concrete for the dam. Plant has storage in bins for 750 cubic yards of aggregates.**

The trailers haul concrete in 4-yd. Gar-Bro buckets, which are among the most unique ever designed for labor-free concrete placing.

These buckets operate independently of a ground man to hook them up, or to dump them at the pour. They have their own power hooks, which are actuated by six bottled nitrogen packs which last through 2,280 cycles, or 9,120 yards of concrete. It takes only 20 seconds for the operator to trigger, from the crane cab, a ratcheted valve which opens or closes the jaws. The hookup is fail safe—even in flight it can't be tripped accidentally. And bucket dumping is easy and positive.

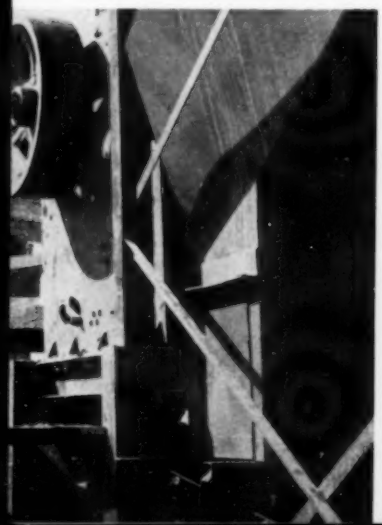
"Remember how dangerous the hookup man's job used to be?" the concrete foreman asked. "This new device cut out that hazard completely."

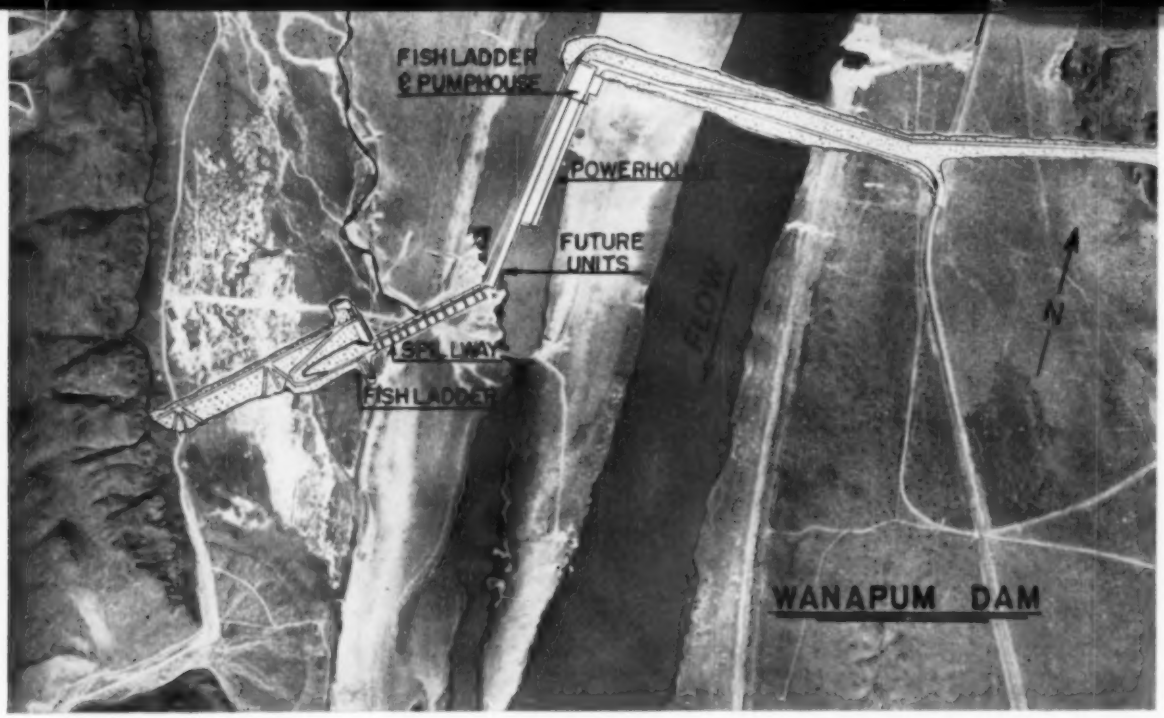
When *Excavating Engineer* visited the dam, two gantry-mounted placing cranes were being used on the spillway, and were scheduled to move to the powerhouse when this structure

(Continued on next page)

(Center) **Self-powered Gar-Bro concrete bucket attaches itself to crane hook, without need for a groundman. It dumps by means of nitrogen gas bottles when it gets over placement point.**

(Lower right) **Raw pit run gravel for aggregate plant is being loaded partly by this 4-yd. Scoopmobile. This loader helps plant turn out production to match the contractor's high concrete schedule.**





Sketch superimposed on aerial photo shows components of dam. The earth-fill dam is Z-shaped, with concrete spillway and powerhouse located near the main river channel.

was completed. These included two Washington whirleys on 60-ft. towers. Two more Washington cranes on 85-ft. towers were at work on the powerhouse, and other concrete placing was being handled by a crawler-mounted Manitowoc 4500. There was also an 80-ton P&H truck crane on the job for miscellaneous heavy lifting.

Concrete forms are generally of the cantilever type, and were furnished by Dixie Form & Engineering Co., Blaw-Knox and Noble. These are all-steel forms. A forming feature of interest, too, is the fact that for the first time in Columbia River dam-building history, steel forms are to be used for building the draft tubes. This was formerly a laborious carpenter job, with intricate layout, wasted lumber and so on. Because eventually there will be 20 draft tubes to form here, steel was economical and practical. The two forms will be used repeatedly here.

From the contractor's point of view, equipment maintenance is as important as production, for it *is* production. If the equipment is used wisely, it will perform close to maximum earning capacity for the life of the job, and then have a good salvage value when the job is finished.

Parts Standardized

For this reason, the contractors have established on-the-job service facilities, standardized on fuel and lubricants, ordered enough spare engines, spare parts units and supplies to do the maintenance job right. And the best mechanics in each of the contractors' force have been hired for this job.

Service facilities consist of a heavy-duty repair shop set close to administrative headquarters, where heavy units are given detailed inspection and service. In addition, there's a tire shop, welding shop, steam cleaning bay, paint room, motor testing room and electrical shop. Lubricants and fuel are sent out to the rigs in the field by mobile Lincoln Lubrovans, and radio communication also makes field service faster, more dependable.

Dry-type air cleaners have also done much to stretch the productive service life of engines. Both Farr and Donaldson cleaners have done remarkable jobs. One motor grader, for example, operated for 2,000 hours on one dry-type cleaner element, in normal dusty service. This was a cleaner which had a first-stage cyclonic air intake action which removed the bigger dirt particles, and a reinforced paper second-stage element.

Supervision for Grant County PUD is being handled by E. B. Gibbons, manager, and R. R. Ries, superintendent of production.

For Harza Engineering, R. B. Jackson is resident engineer, Bert Hall is his assistant, D. K. Kime is field engineer, and Don Gould is office engineer. Contractor's key men include Project Manager George Piedmont, Project Engineer Chuck Peters, Office Engineer M. H. Acker, Gen. Supt. Lee True, Master Mechanic Tony Zaversnik, Concrete Supt. Jim Napper, Rigging Boss Bill McGee, and Electrical Supt. Bill Haggerty.

Dam Statistics

Purpose	Hydroelectric power
Type	Earthfill, concrete spillway
Overall length	8,320 feet
Length of concrete sections	2,920 feet
Max. height above stream bed	185 feet
Rated power head	80 feet
Spillway length	820 feet, 12 50x65 tainter gates
Powerhouse	1,540 x 198 feet
Powerhouse equipment	10 Kaplan 120,000-hp turbines
Ultimate development	20 Kaplan 120,000-hp turbines
Total initial powerhouse Kw	831,250 Kw
Excavation required	10,000,000 yards
Earthfill	4,000,000 yards
Concrete	1,000,000 yards

Long Dragline Raises Efficiency of Gravel Pit

Long reach allows a single machine to strip overburden, cast it well out of the way, and load the gravel—all from the same working position.

REHANDLING, the perpetual bane of earthmoving men, has been licked in a large Arkansas gravel pit. St. Francis Material Co. of Forrest City, Ark., producers of a million tons of sand and gravel a year for eastern Arkansas markets, streamlined operations at their Caldwell (Ark.) pit by replacing a dragline that had 60 feet of boom with a new machine that carries 110 feet.

The rich gravel vein at Caldwell is from 10 to 35 feet thick and is concealed by a clay overburden that averages 25 feet. In developing this pit the Forrest City firm used a medium-sized dragline with a 2-yd. Hendrix bucket. The machine stripped overburden, then moved down onto the uncovered gravel to load hauling units.

Production suffered under this arrangement because this dragline could not strip a large enough area to make room for efficient digging and hauling. To get the overburden out of the way, various other techniques were employed. Sometimes Euclid rear-dumps were pressed into service to haul overburden; or the dragline would climb to the top of its spoil pile and recast the material; other times a TD-18A dozer pushed back the overburden dug by the dragline. Varying combinations of these and other stripping methods were used depending on the varying depth of the gravel.

To put an end to this costly rehandling, the company decided to invest in a single machine large enough to strip the overburden, cast it well out of the way, and load out the gravel—all from the same position.

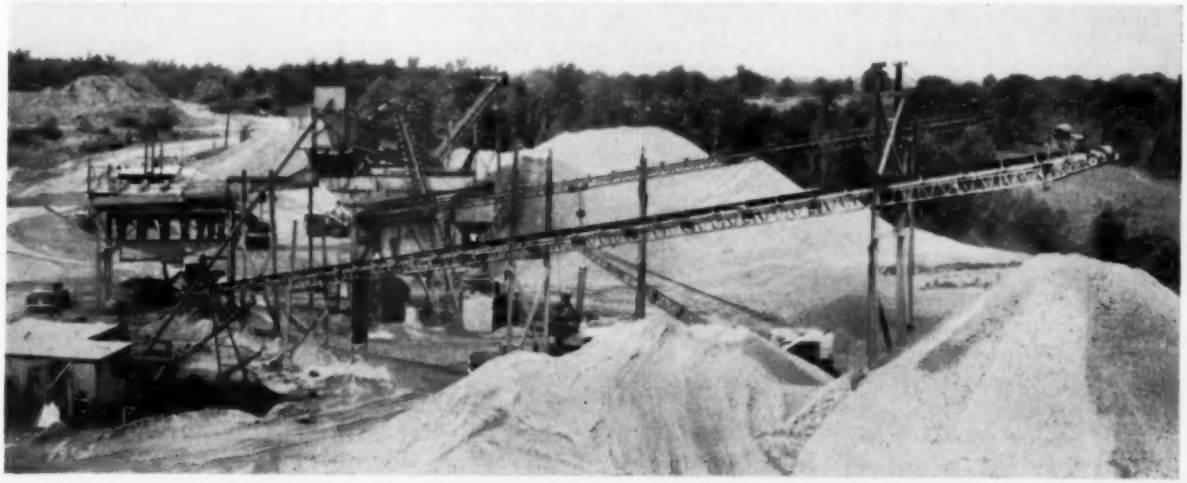
The new Bucyrus-Erie 71-B was fitted with the longest boom that the manufacturer's spec sheets permit for use with the machine's full 3-yd. rated capacity. The dragline is mounted on long-frame crawlers with 42-in. wide treads and is powered by a GM 6-110 diesel. It swings a type TS Hendrix perforated dragline bucket.

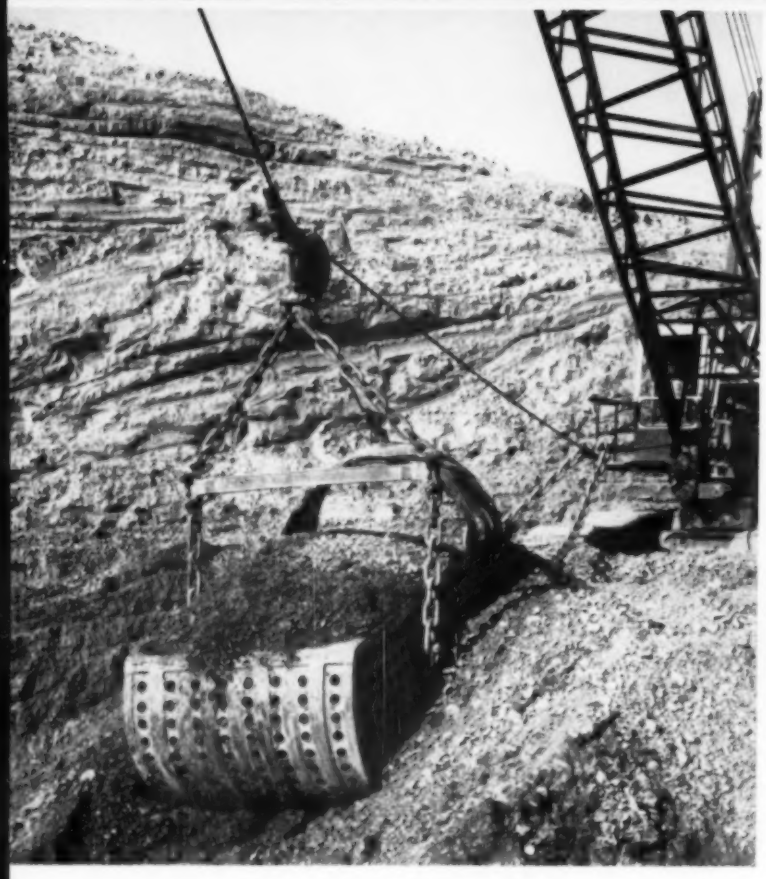
Dragline carrying 110 feet of boom can reach down to dig more than 50 feet from the top of the bank. It is powered by a General Motors 6-110 diesel engine.

"With its long boom the 71-B can move overburden and work the vein itself from the same spot," says Pit Superintendent Charles Shinn. "It can reach down more than 50 feet from the top of the bank," he added.

Where the overburden and gravel

View from atop a sand pile illustrates the general layout of the main gravel plant of St. Francis Material Co. at Caldwell, Ark.





(Left) **Hendrix 3-yd. type TS perforated dragline bucket brings up a heaping load of pit-run gravel.** *(Above)* **Because of its long reach, the dragline can dig deep at the bottom of the pit, bring the load up and spot it into a Euclid rear-dump truck, and also cast aside any waste material—all from one set position.**

vein are both especially thick, the machine strips a portion of the overburden first, cuts itself a bench and ambles into the cut to load the hauling units.

Skillful operation of the big dragline is required when it loads one of the three 10-ton Euclids. Seen from the operator's end of the long boom, the Eucs present a rather tiny target to hit with the 3-yd. bucket load.

The trucks make a half-mile run to the plant over well maintained roads.

An International dozer cleans up around the dragline, and keeps the haul roads in tip-top shape. Frequent rains keep the dozer on the go, maintaining both plant and pit areas.

Pit-run gravel is dumped into a sump hole, about 25 feet in diameter, where it is "washed" by a steady stream of water flowing at about 1,400 gpm. The water comes from a 12-in. diameter, 378-ft. well adjacent to the plant. A 10-in. diameter Layne turbine pump, powered by a 125-hp electric motor, provides a flow of water into the sump sufficient to handle 1,200 to 1,400 yards of pit-run gravel in a 10-hour day. (Approximately 100 gallons of water are required for each yard of raw material dumped into the sump.)

From the "bath" the raw material is transported up into the plant through a Thomas 8-in. diameter suction and discharge gravel pump capable of handling 140 to 150 yards per hour. This dredge-type pump is powered by a Cat D13000 diesel.

Material passes over dewatering screens where water and sand filter through to settling tanks, and the gravel continues on to a Simplicity 5x14 double-deck vibrator. The 1¼-in. and smaller sizes are passed on to the A-gravel stockpile by conveyor. The 1¼-in. plus stone is carried into a Telsmith 36-in. crusher powered by a Minneapolis-Moline butane engine. Crushed material is picked up by a Cedarapids 45-ft. bucket conveyor which returns it to the vibrator for rescreening.

Closed Circuit

In this typical closed-circuit operation, the material keeps repeating the cycle through crusher and vibrator until pieces are reduced to 1¼-in. size.

Meanwhile, the dewatered sand accumulating in the twin settling tanks is fed into a 36-in. diameter Eagle Iron sand screw, turned by a 15-hp electric motor. This slowly-revolving unit further dewaters and "breaks up" the moisture-compacted sand as it ascends to a conveyor that carries it to the sand stockpile.

The entire "dry-type" plant, which includes a Blaw Knox 150-ton, three-compartment batching bin, has seven electric motors, ranging from 1½ to 20 hp.

Four spider-like conveyor structures reach out in different directions to feed stockpiles. The "A"-gravel conveyor is 100 feet long; the pea-gravel belt, 120 feet; and the sand belt, 185 feet. A long 160-ft. flume trough carries waste material into a 5-acre settling pond.

In addition to the 71-B in the pit, St. Francis Material has installed a 22-B clamshell to handle loading of trucks from stock. The ¾-yd. machine loads out sand for concrete and asphalt mix and pea-rock for blacktopping highways and streets. Occasionally the 22-B handles cleanup around the plant and serves as a lifting crane in plant construction.

A Michigan 125-A front end loader normally loads from the A-gravel stock and helps keep stockpiles in shape. The A-gravel is stocked in two classifications—1 to 2½-in. sizes and ¼ to 1¼-in.

According to Superintendent Shinn, 75% of the sand and gravel produced at the Caldwell installation is trucked from the plant—in most cases direct to various construction projects. The rest is shipped by rail from a Missouri-Pacific siding about ¾-mile distant. Shipments from the other St. Francis Material Co. plants follow a similar pattern percentage-wise.

Most of the shipments are destined for markets in eastern and southcentral Arkansas and a small portion of northeastern Louisana with the heaviest demands coming from road construction firms. Some shipments are also made to ready-mix plants.

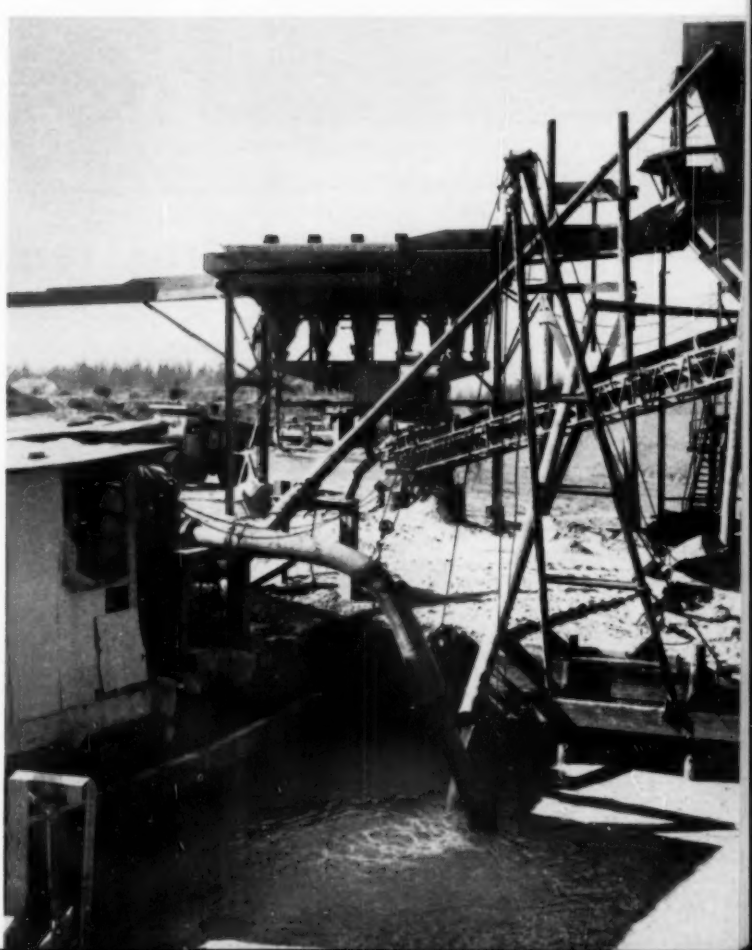
To accomodate customers in widely-scattered areas of the state, St. Francis keeps four other pit-haul plants in operation. Pits at Crossett and Harrell are like the Caldwell set-up, that is material is dumped into a water-fed sump hole and pumped into the plant.

At Crossett, a P&H 455 dragline equipped with 1½-yd. Hendrix bucket works the pit, and a 2-yd. Hough front-end loader handles loading from the stockpiles. Five 10-ton Euclid rear dumps and a Ford dump truck (for cleanup) handle plant hauling assignments. An 8-in. diameter Thomas suction-discharge pump feeds the plant at the rate of 140 to 150 yards per hour.

Operations at both Jonesboro and Whitehall, north of Forrest City, are completely "dry." In both setups, material is dumped into job-built hoppers placed over Telsmith reciprocating feeders which convey the material to the plant on 24-in. wide heavy-duty B. F. Goodrich rubber belt. Both plants were built by the company, using various makes of screens, vibrators, crushers and classifying equipment.

At Whitehall, a pair of Northwests handle loading chores—a 2-yd. model 6 dragline in the pit and a model 25 clamshell with lightweight 1-yd. bucket at the plant. Two 13-yd. Euclid bottom-dumps and a pair of dump trucks, (a Ford and a Chevrolet) round out the hauling fleet. This does not, of course, include the scores

(Below) **Material from the pit is end-dumped into this sump hole where it is washed by a steady stream of water piped from a nearby 12-in. diameter well.**



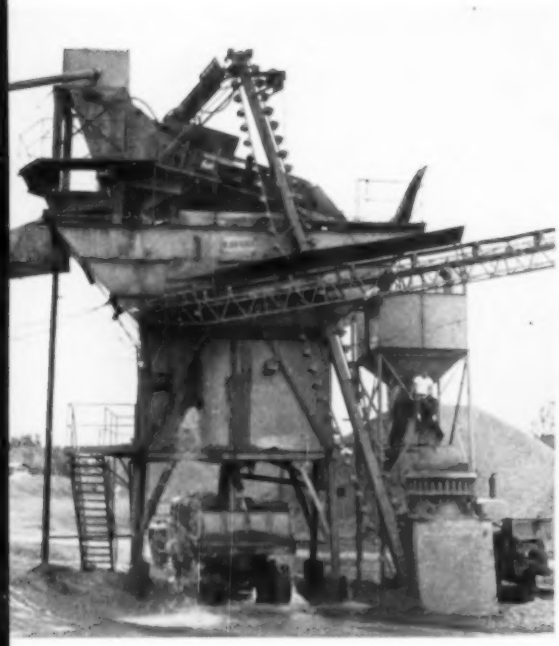
(Right) **From the bath, the raw material is transported up into the processing plant through this Thomas 8-in. suction and discharge gravel pump that handles 140 to 150 yards per hour. Pump is powered by a Cat D13000 diesel.**

of rental trucks darting in and out of all plants to haul for local consumers.

At Jonesboro, a Bucyrus-Erie 38-B dragline equipped with 2-yd. Hendrix bucket handles the stripping and loading from the pit, and a new 2-yd. L-20 Euclid front-end-loader loads trucks from stock. A single 16-yd. Euclid bottom-dump adequately supplies the hopper with pit-run gravel, working a ⅛-mile haul.

Most of the pit-plants follow the same work schedule—10 hours daily, five days per week during the summer and 8-hour shifts, five days a week during the slower winter months. The sixth day is generally set aside for routine repairs, equipment checks, and plant clean-out.

In addition to Superintendent Shinn at Caldwell, pit superintendents are W. L. Hoffman at Harrell and Crossett, and J. M. Dowdy at Whitehall and Jonesboro.



(Left) **The Caldwell plant features this 150-ton capacity three-compartment Blaw Knox batching bin.** ***(Right)*** **A new 2-yd. Euclid L-20 sets a busy pace loading truck from stockpile at the Jonesboro plant.**

Growing Partnership

BUILDING up a gravel business from a small one-pit operation to a five-plant complex that produces a million tons a year has been the life's work of a pair of Arkansas earthmoving veterans who head up St. Francis Material Co., at Forrest City, Ark.

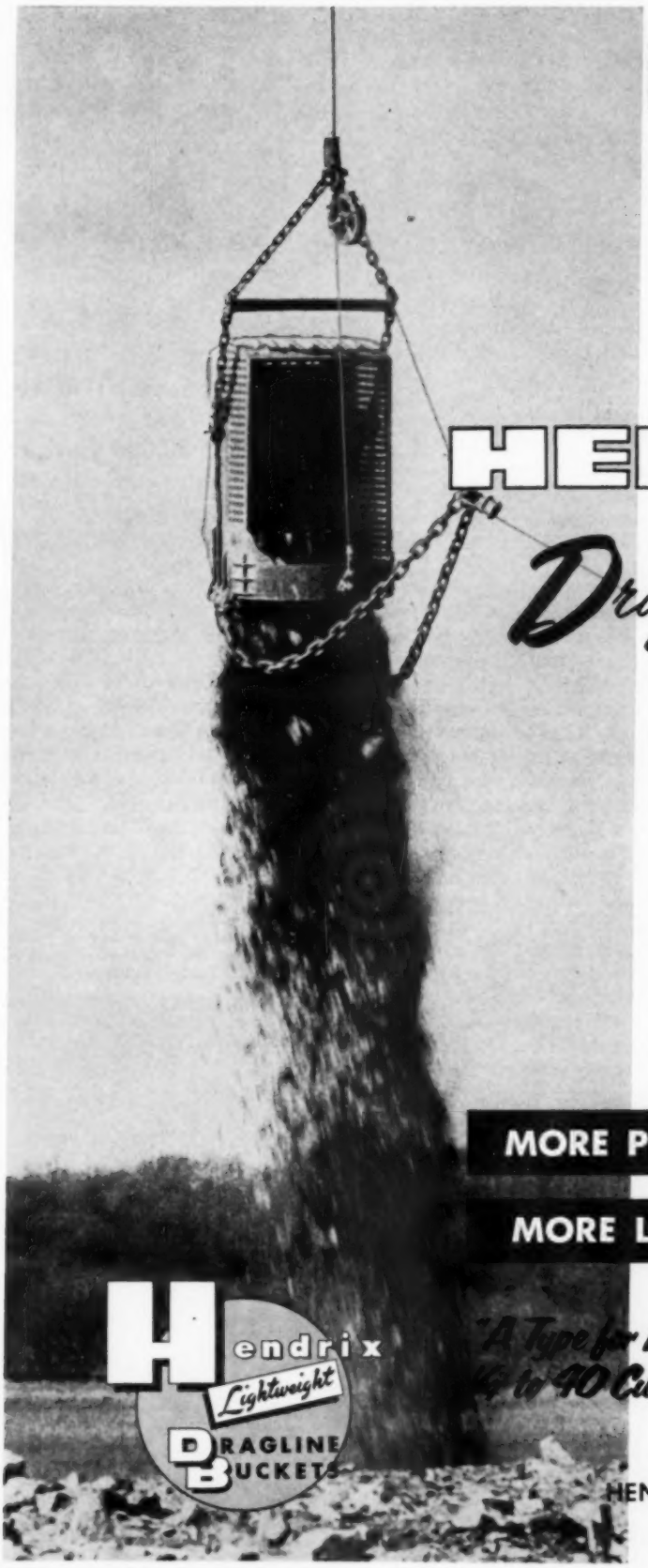
Ben M. Hogan, Sr., and Charles T. Turner launched their gravel business under the name of Hermitage Gravel Co. in 1937 at Hermitage, Ark., to supply the needs of nearby contractors. They continued to gear their production to the demands of their customers, and their business increased to match the growth of the construction activity in the region.

The firm was incorporated in 1946 as St. Francis Material Co. with permanent pit-plant headquarters at Forrest City, Ark., and a full scale pit operation at Harrell, Ark. Anticipating and developing new markets, the partners developed additional pits as Crossett, Whitehall and Jonesboro during the next few years.

In the Forrest City area the firm now owns 900 acres and has leased an additional 1,000 acres of land near Caldwell. Near the main company office, the company recently set up a 100-ton Gregory ready-mix concrete batching plant to take care of present and future local construction.

When construction of new interstate system highways get underway in the area, St. Francis Material Co. will be ready to supply subbase material, aggregates and mixed concrete to the contractors.

Still at the helm of this corporation today are the original partners —Hogan is president, and Turner is secretary-treasurer. And proving the success and permanence of their enterprise is the fact that a second generation of the partnership is finding its way into the growing company. Hogan's son, Ben, Jr., has become vice president; and young Charles N. Turner is "just getting his feet wet" in the business as a scale operator.



PROFIT HEAVY

HENDRIX

Dragline Buckets

The Hendrix Bucket design and scientifically-arranged perforations eliminate excess bucket weight to allow more payload *inside*, where it belongs, for . . .

MORE PROFIT PER LOAD

MORE LOAD PER CYCLE

Hendrix Lightweight DRAGLINE BUCKETS

"A Type for Every Digging Purpose"...
4 to 40 Cubic Yards–Perforated or Solid

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

St. Louis Builds

(Above) **Curtain-wall or campus-type building is part of Monsanto's headquarters in St. Louis. New $5 million research center is of matching construction.**

Delicate instruments at research center site mean NO BLASTING, so 30,000 yards of sandstone are ripped out with hardfaced hoe dippers.

(Below) **Over 15,000 lineal feet of deep utility trenches are needed to serve Monsanto's many laboratories. Notice straight, clean cuts achieved with hoes.**

IT'S been said of the construction business that it's a lot like spelling Mississippi—a matter of knowing when to stop.

But with Fruin-Colnon Contracting Co., St. Louis, it has been a matter of going and growing throughout its 88-year history. Here the green "GO" lights have been burning since the 1870's when Jeremiah Fruin laid the foundation for the company's growth and "GO" with 2,000 men and 175 mule teams to successfully complete jobs covering the area between the Indian Territory and the Atlantic Ocean. A good many of the buildings erected during the early days of the company, still standing and in use, have become historical landmarks.

Fruin-Colnon, a unique employee-owned corporation doing $50 million plus a year, ($70 million in 1959) might be said to be building tomorrow's landmarks today. It is an organization of skilled, experienced construction men with enthusiasm for accomplishment. Accepting obstacles and responsibilities as a matter of course, Fruin-Colnon men tackle the everyday problems of construction with efficiency and experienced know-how.

5,000 Projects

Fruin-Colnon builds almost everything. Almost 5,000 separate construction projects have been successfully handled during Fruin-Colnon history—one every 24 working hours.

Fruin-Colnon's job roster reads like a "Who's Who" in the construction industry—it works throughout the United States. Fruin-Colnon International, handling the Middle East, is based at Tehran, Iran. Fruco Construction Co. handles work in Canada, while Fruin-Colnon of the Americas covers South America.

Since 1956 Fruin-Colnon has expanded its concentration on building

(Below) **Working in close quarters, 22-B hoe opens up section of deep trench. Dipper teeth are hardfaced to cope with 12-ft. thick sandstone.**

Contractor Big Lab

by L. H. Houck

and factory construction to include highway and bridge construction and heavy construction of all kinds.

One of the more interesting jobs just being completed is the Monsanto Research Center at Monsanto's headquarters in St. Louis. When completed this year, the new research center will bring hundreds of Monsanto scientists together to probe the future and live out one of Monsanto's mottos, "Look deeper, search farther, think harder." Monsanto scientists have developed innumerable chemicals, plastics and petroleum products used in agriculture, medicine, atomic power, space-age technology and general industry. The building of the new research center with the necessary excavations, and associated trenches, is complicated because of the existence of operating laboratories on the site. The contractor must work virtually on tip-toe. Too great a disturbance could well upset measurements and calculations in which millions of dollars and thousands of manhours had been previously invested. This means no blasting, no shocks and not too much confusion of air hammers and exhausts can be permitted.

Monsanto's new $5 million Research Center is on a landscaped 52-acre site alongside U. S. highway 66 bypass several miles south of Lambert airport.

Building the research center involves more than the usual number of details and complications because of the use to which the new facility will be put. It is more like building an industrial city! Trenches have to be excavated—more than 15,000 feet, all at critical depths and precise elevations. These trenches contain storm sewers, sanitary sewer lines, electric conduits, chilled water lines for air conditioning, steam lines, condensate returns, fire lines and domestic water and gas lines.

How to stack these lines is another problem—increasing the critical nature of the physical aspects of the trench, since a small variation in one place could add up to become a big and costly error in another area.

The research center consists of three separate buildings located near the general office and laboratory buildings. All are of curtain wall construction, sometimes called campus-type architecture.

For the buildings themselves, there are more than 15,000 lineal feet of trenches, grading, extensive clearing and site work involving excavation of 300,000 yards of dirt and 30,000 yards of sandstone. One of the buildings requires a basement excavation 20 feet deep and some trenches are 25 feet deep. The first excavated material was dumped in a swampy area destined to become a permanent parking lot, with a temporary use as a parking lot for contractor employees.

The main problem is sandstone in thicknesses up to 12 feet, none of which can be blasted. In the larger excavation areas, Fruin-Colnon uses a rear-mounted ripper on a Euclid TC-12 twin-engine crawler tractor, ripping in 2 to 20-in. slices. Although a relatively slow process, this proved

(Right) **Hough Payloader transports a section of steel pipe form for foundation hole.**

Material is scooped up and loaded into dump trucks. Excavation totals 300,000 yards of dirt and 30,000 yards of sandstone.

successful enough, but the method cannot be used in the trenches. It was decided that unless the sandstone could be ripped by the dipper teeth of two Bucyrus-Erie 22-B hoes, that it would have to be removed by hand —a laborious and costly method.

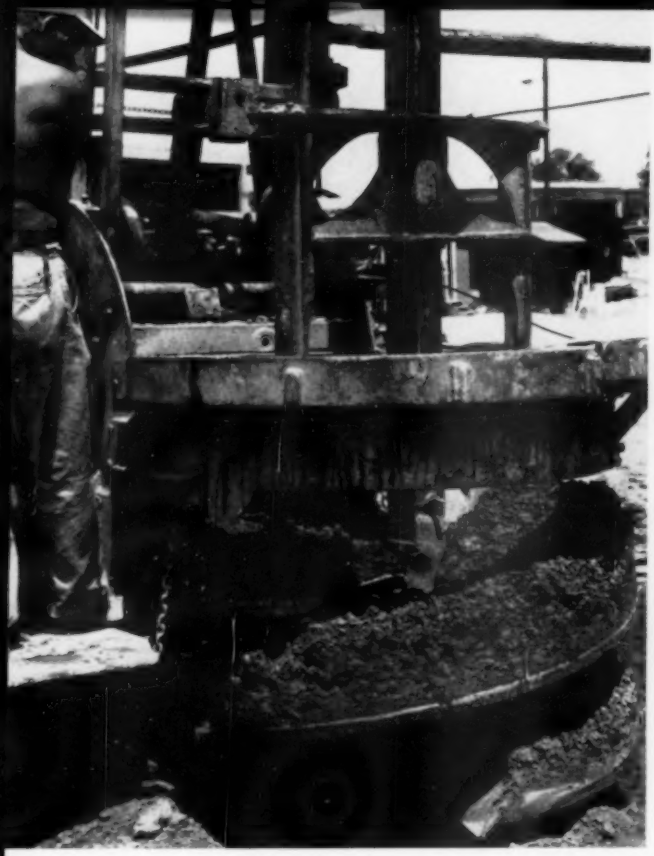
After some experimentation, the dipper teeth on the hoes were hard-faced by welding, rebuilding with a slight oval on the under side and a slight upturn to the points. These dippers soon proved their ability to scrape out grooves and then pry out good dipper loads. Trench widths were regulated by dipper widths. All the trenches are handled by the two Bucyrus-Erie 22-B hoes, while a third heavy-duty 22-B is equipped as a crane for general work. Trenches are checked, lines installed on blocks, leveled and bottoms of trenches bedded down with clean crushed rock.

Surface excavations, excavation in connection with landscaping and excavation for the detention basin are handled with three Euclid TC-12 crawlers, two equipped as dozers and one as a ripper, all with Allison torque converters. The non-dozer ripper, uses a pushblock for push loading the six Euclid S-18, 18-yd. scrapers on the job.

Other tractors are an Allis-Chalmers HD-21 with dozer, used mostly for towing compaction equipment on the fills, and a Caterpillar D8 with dozer.

The detention basin is an interest-

(Above) **Key F-C personnel on the Monsanto job are: *(from left)* Bob Hilton, project manager; George Mohore, general superintendent; and field engineers Ted Mueller, Bob Winkler and Ed Vogelgesang. *(Right)* Water detention basin protects nearby housing project.**



(Left) **Foundation pier holes are drilled as much as 30 feet down with this auger rig.** ***(Above)*** **George Mohorc, general superintendent, shows hardfacing on hoe's dipper teeth necessary to scrape out tough sandstone without blasting.**

ing part of the project. To the south of the project lies a substantial subdivision of exclusive dwellings, through which runs a natural drainage creek, beautified and landscaped into the subdivision for the most part.

With the addition of the new research center and the many changes in the contour of the land to conform with the landscaping, there was some fear that the outflow of rain water into the creek would exceed its former natural flow and flood some of the residential area. To eliminate this possibility, Monsanto had a study made of 50-year rainfall records and then designed a detention basin that would hold back the flow so that in no case, even if rains exceeded the past records, would the capacity of the basin be exceeded.

This discharge of the 35-ft. deep, 150-ft. wide and approximately 300-ft. long detention basin is held to the capacity of its 36-in. discharge pipe. In addition, an adjustable standpipe was built so that water in the basin could be retained at predetermined levels higher than normal when desirable.

For loading out trucks with excavated material, F-C has two Cat No. 977 Traxcavators. A Hough Payloader on rubber handles steel forms for caisson foundation piling. Other equipment includes a Cat No. 12 motor grader, two D8's with dozer blades, a D8 pulling a Cat No. 80 scaper and an Allis-Chalmers HD-16 with a 10-yd. Garwood scraper.

Average number of men on the job is 140, working a single 8-hour day. When visited by *Excavating Engineer*, the job had worked 29,252 hours without a lost time accident.

The research center will be completed this spring. It has been one of F-C's many jobs for Monsanto—in fact, F-C has now completed over 270 contracts for the firm.

Recent Jobs

Some recent jobs completed by Fruin-Colnon include new structures and offices for Granite City Steel Co., Granite City, Ill.; a new deck for the MacArthur Bridge across the Mississippi—completed more than 100 days ahead of schedule; a 2½-million-bushel grain elevator involving slip-form construction; the west end department store for Stix, Baer & Fuller; a joint-venture uranium processing plant at Weldon, Mo., and a joint venture U. S. military personnel records center with 37 acres of floor space.

Currently underway is a cement plant in Mitchell, Ind., for Lehigh Cement Co., and a joint venture at Lesterville, Mo., in construction of Union Electric's pumped storage power plant—the largest such plant in the world.

Fruin-Colnon has approximately 350 permanent employees who own the company. If an employee retires or leaves the company, his stock is repurchased and reallocated.

Over a full year, there are more than 1,500 employees on the payroll. Equipment inventory is close to $3 million.

Fruin-Colnon is headed by youthful John P. Soult, 41, president. Executive vice president is Aaron A. Pierson. Vice-presidents are: Fred C. Ahrens, building and industrial division; Stuart M. Butler, western division; Donald M. Koch and Martin F. Leonard, Indianapolis division; Robert D. Mudds, sales; and O. A. Ray, heavy division.

Bob Christman is in charge of equipment and manages a shop employing 10 full-time mechanics.

On the Monsanto job, Bob Hilton is project manager; George Mohorc, general superintendent; Art Kurtz, project engineer. Field engineers are Ted Mueller, Bob Winkler and Ed Vogelgesang.

Shovel's 3½-yd. dipper rips out portion of a rocky hill to clear way for access road.

Wellpoints Tame River for Easy Digging

Excavation for the spillway at Oklahoma's newest dam reaches 40 feet below river level. Digging is in dry material all the way down, thanks to a two-stage wellpoint system.

SCRAPERS pulling out river-bottom silt on the site of Eufaula dam, in eastern Oklahoma, pan dry paydirt while the Canadian River flows by just a stone's throw away. What's more, the big spillway cut—already 20 feet below river level—will go down 40 feet to bedrock and still be dry enough for the hustling rubber-tired dirtmovers.

Wellpoint magic truly parted the waters here, to allow the contractor to move in on dry ground. The cofferdam that rings the work site juts out into the sluggish river, forcing all flow into a narrow channel. Fighting relentlessly for its old path, the water infiltrates under and through the cofferdam. A two-stage wellpoint system stops the seepage cold.

Setting for this drama is the broad valley of the Canadian River about 75 miles southeast of Tulsa. Here the

Twin rows of wellpoints seal out river flow from spillway site. Insley crane sinks 2-in. diameter points to a depth of 25 feet.

Fleet of eight scrapers moves an average of 9,000 yards of dirt each 10-hour shift. Loading run takes just 40 seconds.

Corps of Engineers has laid out a beachhead in its battle to control the Canadian—and eventually the Arkansas River into which it flows. On this site will rise Eufaula dam, named after a nearby city. Completion of the $126 million project is scheduled for 1965.

For many years before it won an official okay under the federal River and Harbor Act of 1946, the dam had been a fond gleam in the eyes of home-town boosters. They saw mainly the local benefits of the project—a sparkling lake for boating, fishing and swimming; a clean water supply close at hand.

Combination Dam

The dam itself will combine earth-fill and concrete design—the former in a non-overflow section 2,660 feet long; the latter in the spillway and powerhouse that add up to a length of 520 feet. Eleven tainter gates, each 40 feet wide and 32 feet high, will control water flow over the spillway.

Construction crews first tackled the river in 1958. Their task—to throw a cofferdam around the work site on the north side of the river.

Webster Boland, resident engineer for the U. S. Army Corps of Engineers, details the work schedule on a big plan sheet tacked on his office wall. His finger traces the U-shaped cofferdam.

"The cofferdam squeezes the river into a narrow channel on the south side of the valley," he explains. "When the contractors raise the spillway well above water level, we will

Realistic Approach to Relocation Problems

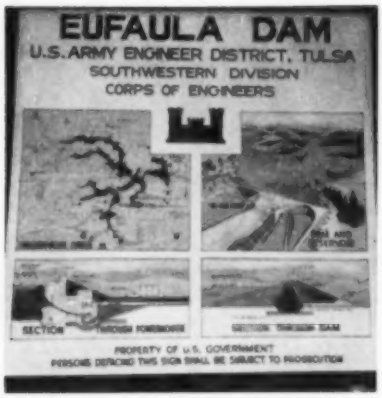
As water backs up behind Eufaula dam, it will create one of the largest lakes in Oklahoma. It will also create vast construction problems. Roads, railroads and utility lines must be shifted out of soon-to-be-flooded areas.

How big a task is it? Well, at Eufaula, work has already started on the first 10 miles of new highway. Still in the planning stage are another 170 miles or so. Federal and state highways account for about one-third of this mileage, county roads the rest. Add to this about 40 miles of railroad, 75 miles of pipeline, 80 miles of power lines and 20 miles of phone lines, and you get a picture of the complex job to be done before the reservoir is filled.

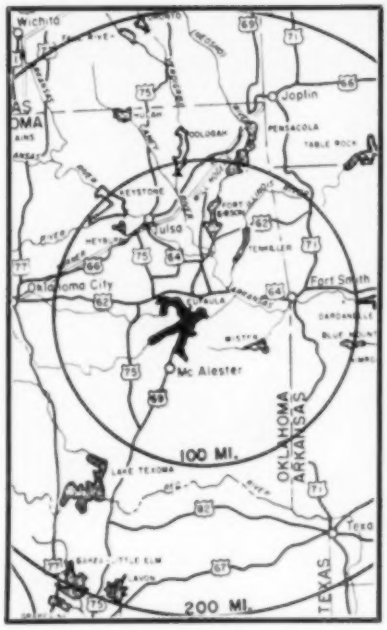
The Corps of Engineers views relocation work realistically. The idea is to build worthwhile improvements, not temporary makeshift bypasses. So they devised simple ways to squeeze the most value from every dollar spent. Here are a couple of examples:

• Bidding alternates—Relocation of US 69 and the parallel MKT railroad near the city of Eufaula involves wide earth causeways (one 1.75-mile stretch calls for 12 million yards of fill) and a major bridge. The Corps invited bids on the entire job, or on any of four component sections within the 10-mile stretch: This plan gave the "big boys" a chance at the job, but didn't freeze out smaller outfits. Of course the lowest price (in this case bids from four separate contractors) won the award.

• Top-level cooperation—Oklahoma's Department of Highways goes along with the Corps in planning the relocations to up-to-the-minute standards. Why replace traffic-choked two-lane US 69 with a new two-lane highway, they reasoned. So the state antes up extra funds needed to build the causeway and bridge to modern four-lane specifications. It costs just a little more while the work is under way. Widening the road later, however, would be a major expense item.



(Above) **Sign at tourist overlook gives visitors the complete Eufaula story.** *(Right)* **Dam is located in busy vacation area.**



Before the second stage wellpoints were hooked up, earthmovers found the going wet and slow. Cat D9 *(above)* push-loads DW21 scraper through wet area.

divert the river through one of the unfinished gate portals. Then work on the earthfill dam can begin."

He points to the outer end of the cofferdam to show the cellular sheet-pile wall there. This bulkhead resists scouring action by the swift-flowing water in the temporary channel. The upstream and downstream walls of the cofferdam are simple earthfill barriers. Pit-run riprap protects the dirt from erosion by stream action or rainfall.

When a joint venture team (Tecon-Green-Winston) won the $14,673,000 spillway contract, the first job they faced was keeping the river out of the cofferdam. Water flowed freely through the porous river-bottom silt. As Ralph Doty, the Corps' engineer in charge of the spillway recalls it, all you had to do to strike water was scuff your shoe along the ground.

Fred Brandt, superintendent for the contractor, talks of those days too. The job plainly called for scrapers: almost 1 million cubic yards of sandy silt to be moved to expose the bedrock about 40 feet below stream level. The cut shaped up like a big Roman arena. In plan, it measures 1,300 feet long, with a bottom width of 180 feet, and top width of almost 900 feet.

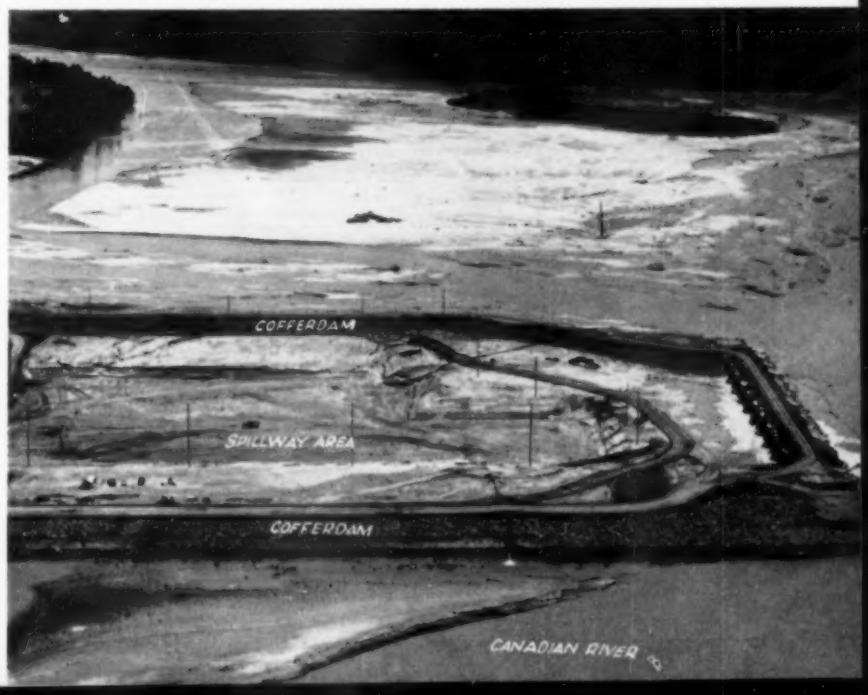
Subgrade Engineering Corp. took on the job of drying up the spillway site. The plan called for a two-stage system. An outer ring of wellpoints was placed at stream level. Then, when digging reached down about 20 feet, an inner ring was used to seal off seepage right down to bedrock.

The wellpoint crews laid out the first-stage ring roughly parallel to the cofferdam. An Insley crane swung a jet-punching device to sink the 2-in. diameter screen-tipped points to full 25-ft. depth.

The men spaced the points about 3 feet on centers—close enough to stop all water in this sandy soil, even against a flood crest outside the cofferdam. Then they strung a 12-in. diameter header pipe. With rubber hoses or pipes, the workers hooked the points into the header line.

Power behind the first-stage dewatering system is a pair of Stang 10-in. wellpoint pumps, driven by GMC diesel engines. The pumps pull out about 25,000 gpm. The water flows through an outfall line that dis-

Water, water everywhere . . . except in the enclosed spillway area. Outflow pipe through earthfill cofferdam discharges about 25,000 gpm into river.



charges into the river on the upstream side of the cofferdam.

With the pumps turned on, dirt-moving moved into high gear. The contractor brought in a fleet of eight scrapers—five Euclid TL-20's and three Caterpillar DW21's.

The scraper operators took full advantage of ideal conditions in the smooth sandy pit. With the pan squared away for loading, a Cat D9 tractor gently nudges up to the push block. In less than 40 seconds, dirt boils over the sideboards. The scraper takes off with a heaping 25-yd. payload aboard.

High-type haul roads give the operators a chance to open up wide on the run to the stockpile area. It is about a 3,000-ft. one-way haul, but the trip takes less than 2 minutes. With fast unloading on the stockpile, total cycle time comes to just about 6 minutes.

The volume of dirt moved reflects the hot pace of the job. The scraper fleet clocks an average of 9,000 cubic yards each 10-hour shift. On the best day they hit a much higher mark—almost 14,000 cubic yards.

Material from the cut is destined for use in haul roads and the dam. It makes ideal fill. Natural moisture measures within 2% of optimum. The sandy silt compacts well.

At the time *Excavating Engineer* visited the job, the scrapers had pulled out about 20 feet of silt. The well-point crew now hustled in to jet and set the second-stage points. With both stages working full head, about 40,000 gpm of seepage should be pumped back into the river. The men point out how effective the system is. The dry sand easily holds a 1 on 1 slope as the scrapers dig deeper.

The contractors had about 180,000 cubic yards of rock to move. Most of this was loose or "rotted" rock at the bottom of the cut. Some heavy rock cuts, however, must be dug to shape access roads along the bluff at the dam abutment.

Work crews shoot the sandstone and shale rock to loosen it for easy shovel handling. A Bucyrus-Erie 71-B, with a 3½-yd. dipper, then loads the shot rock into a fleet of Euc rear-dumps for the haul to spoil areas.

This shovel has a big job ahead. After the access road work is finished, the 71-B will move across the river to a quarry that is just being opened.

Work at Eufaula dam is under supervision of the U. S. Army Engineer District, Tulsa, Okla.

Sandy clay boils up over scraper's sideboards on U.S. highway 69 relocation job. Highway relocations for Eufaula dam will total about 180 miles, railorad relocations about 40 miles.

Eufaula Dam Statistics

DAM	
Over-all length at top	3,180 feet
Height above stream bed	112 feet
Spillway length	520 feet
Spillway capacity	463,000 cfs
Number of gates	11
Size of gates	32x40 feet
POWERHOUSE	
Installed capacity	90,000 kw
Average annual energy	317,000,000 kw-hr
RESERVOIR	
Drainage area above dam	47,522 sq. mi.
Water storage	3,848,000 acre-ft.
Flood control	1,470,000 acre-ft.
Power	1,481,000 acre-ft.
Reserve	897,000 acre-ft.
Shoreline length (top of flood control pool)	800 miles

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The light patterns show that, with SKOOPER, all motion means work . . . there are no flying starts, no spinning tires, no churning crawlers, no waste drive-in, back-off motion . . . SKOOPER stays in one spot and really bails dirt, delivers big loading tonnages — using less horsepower, with less maintenance!

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NEWS FROM THE FIELD

Five more tons of Minnesota iron ore every trip are carried by new dump truck at right, which has a lightweight alloy steel body. It's one of a new fleet bought recently by U. S. Steel's Oliver Iron Mining Div.

Truck Payload Capacity Increased by T-1 Steel Body

Another step in the mining industry's efforts to make Minnesota iron ores more competitive was taken recently when U. S. Steel's Oliver Iron Mining Division specified the use of a new high yield strength steel for truck bodies. The steel will increase the payload of its mine haulage trucks by reducing dead weight.

The use of the new material, which is called USS "T-1" steel, will permit trucks to carry more ore in proportion to their over-all weight. Oliver engineers hope that resultant cost saving will assist Minnesota ore to overcome the advantages of higher quality ore from other sources.

T-1 steel not only combines high strength with toughness, but has other distinctive features. It has great resistance to impact and abrasion and can withstand unusual stresses in a temperature range from 900° F to -50° F. It is corrosion resistant and readily welded.

Great strides have been made in recent years by manufacturers of off-the-highway trucks. Larger and larger vehicles have been designed and, today, 45-ton trucks are as commonplace as 15-ton units were a decade ago. T-1 steel has been used effectively in recent years in other fields and was recognized by Oliver engineers as having distinct possibilities for the manufacture of haulage equipment.

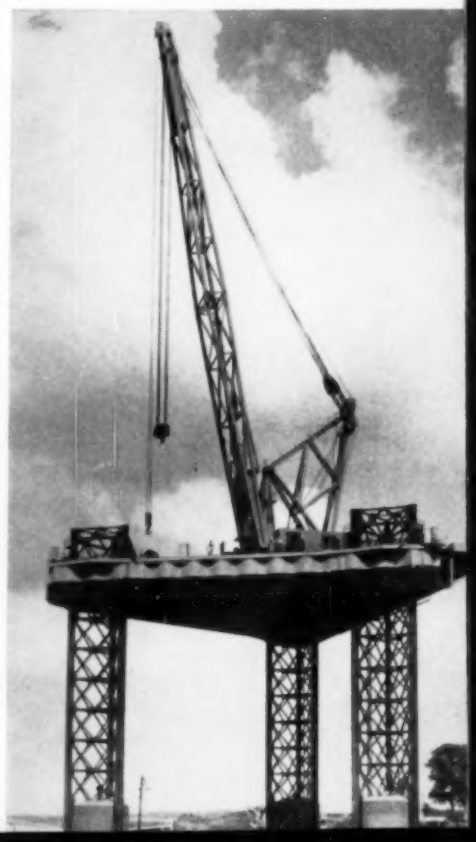
The mining firm has had satisfactory experience with the material in 40-yd. capacity side-dump, standard gauge railway cars. These cars haul iron ores to Range beneficiation plants, or carry worthless rock and surface overburden to stripping dumps. Their T-1 steel sides and bottoms stand up well under the combined beating of heavy loads of abrasive materials and wide variances of Minnesota's climate, where temperatures range from 100° in August to 40° below in January.

Mobile Island Crane Drives Underwater Piles

A LeTourneau "Mobile Island" crane being used in the construction of a bridge across Lake Maracaibo in Venezuela serves a double purpose. During construction of the bridge, it is being used to drive piles for piers and to place prefabricated structural sections.

The unique marine mechanism features a 250-ton all-electric giant crane that is mounted on a mobile, self-elevating offshore island. This three-legged island can be towed to the immediate job site, providing speed and efficiency of operation. The legs, powered by electric gearmotors, are lowered to the bottom and the platform raises above the water, ready for action.

When the island is elevated, the deck crane is provided a stable base that permits precision control of the load anywhere within a 360° swing. As an added advantage, the crane can



continue to function during periods of adverse weather.

When the crane is ready for movement to a new position, the island is lowered to the surface, the legs are retracted from the bottom and the mobile crane is towed to the next location.

LeTourneau electric gearmotors on the all-electric crane are located directly at the point of work. The drives that raise and lower the three long legs are Timken bearing equipped.

R. L. Smith to Head B-E Sales Promotion

Robert L. Smith has been named manager of sales promotion for Bucyrus-Erie Co., South Milwaukee, Wis. He had been a sales representative attached to the firm's Chicago regional office for six years. During that period he served in the Detroit area and other midwestern territories.

A graduate of the University of Kansas City, Smith was employed from 1949-55 as a sales representative of the Minnesota Mining and Manufacturing Co. in the Kansas City and St. Louis areas. During World War II, he was an air force pilot with the rank of first lieutenant.

R. L. Smith

In his new position Smith is in charge of Bucyrus-Erie's publicity, advertising, publications, sales literature and other sales aids. He succeeds Frank T. House who was recently appointed to the newly created position of sales services manager, in charge of field service, parts sales, dragline bucket sales, claims and sales promotion.

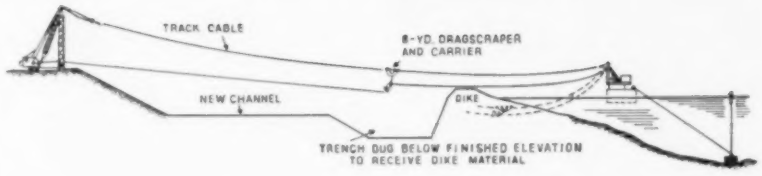
Fast-Drying Pipe Primer Saves Time, Manpower

In the first "over-the-ditch" pipeline application, a fast-drying primer was credited with saving time and manpower.

Under the conditions encountered on the job, the all-purpose primer dried in a matter of minutes, as opposed to the normal three to four

(Continued on page 38)

Eight-Yd. Sauerman DragScraper Cuts Seaway Dike Removal Costs



Atlas Construction Co. Ltd., Montreal, Que., had the job of enlarging the St. Lawrence Seaway channel near Iroquois, Ont. An 8-yd. Sauerman Crescent DragScraper and four-wheeled carrier was used with a crane to remove the perimeter dikes composed of tough digging glacial till and to backfill the trenches.

The hoisting line of the crane, used as a track cable for the Crescent and carrier, ran through a block on the boom tip to a 25-ft. tail tower mounted on a 20 x 40-ft. barge. The structural steel spud mast used to support the boom was pin-connected to facilitate movement of the crane.

After inhauling to the trench, the 8-yd. Crescent was gravity-returned part of the way to the excavation. A single-drum hoist mounted on the barge tail tower controlled the backhaul cable used to complete the return cycle. The job was handled by two operators, one on the crane and the other on the barge. The operating span varied from 600 to 900 ft. Average DragScraper hauls were 300 to 600 ft.

This is a typical example of how a crane can handle a Crescent DragScraper of greater capacity than the original dragline bucket or clamshell. Larger machines can usually double their capacity with a DragScraper. Smaller units can handle about 50% more. Machine range is limited only by the spooling capacity of the hoist drums. It can reach farther, dig deeper under water and take material out of soft areas without the nuisance of mats and the hazard of undermining the crane.

DragScraper traveling down track cable on return to underwater dike. Barge is in background.

When the boom is supported by a strut, a DragScraper of still greater capacity can be used. The strut increases overturning resistance and allows a greater load to be imposed. Crescents used in conjunction with such supports increase the rated capacity as much as 4 to 1.

Many operators consider the Crescent DragScraper as standard auxiliary equipment. The DragScraper permits bidding on and getting those premium jobs that could not be handled without considerably more time and expense by other means.

Find out how much you can increase your crane's capacity. Write or call giving the make, model number and boom length of your machine. Field Report 228 and Catalog J gives more information on DragScraper operations with cranes.

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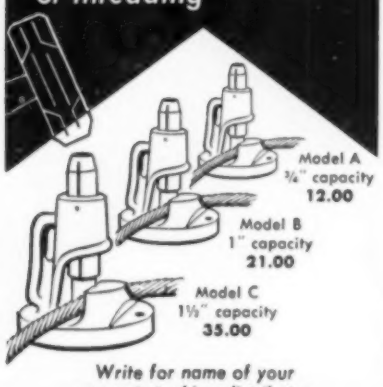
WITH A HAMMERBLOW . . . 3 SHARP RAPS CUT WIRE ROPE CLEAN . . . *leave it round, ready for splicing or threading*



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News . . .

(Continued from page 37)

hour drying period of conventional primers. This made it possible to run cleaning-priming and coating-wrapping virtually together, resulting in easier and more effective supervision, elimination of some manpower and a smoother operation.

The primer also provided a bond that is as much as five times stronger than conventional primers, according to Koppers Co., Pittsburgh, Pa.

A product of the tar products division of Koppers, Bitumastic Jet-Set —as it is called—was used by a large eastern gas company on a 33-mile section of a 20-in. gas pipeline installation over mountainous terrain.

The primer was applied cold and followed by a coating of Bitumastic No. 2 coal tar enamel. The covering was tar saturated #15 asbestos felt.

Although this was the first over-the-ditch job for this product, Jet-Set has a history of usage on hydro-electric penstocks, water pipe and tanks, piling and gas storage tanks. It consists of synthetic resins and solvents blended to produce a liquid coating which may be applied cold by brushing or spraying.

Due to the drying and bonding characteristics of the primer, it was possible to prime, coat, wrap and lower-in virtually in a single operation. Temporary skids and attendant manpower normally used between the priming and coating operations were eliminated.

Coverage of the premium primer averaged 700 square feet per gallon as opposed to 400 feet by conventional primers on the same kind of pipe. No time was lost because of "dead" primer.

Experimental Dual-Engine Scraper Unveiled at A-C Dealer Equipment Show

The construction industry got a peek into the future when a big Allis-Chalmers experimental dual engine motor scraper was shown for the first time at the firm's recent "Power Parade" sales show.

The two-day machinery display program was held March 27-28 at Springfield, Ill., for the firm's construction machinery division dealers in the United States and Canada.

The giant earthmover has a capacity of 40 cubic yards heaped, and is powered by two Allis-Chalmers 340-hp diesel engines. The all-hydraulic unit, now undergoing extensive development tests in actual construction conditions, weighs 95,000 pounds and has a speed of 30 mph. The unit is expected to be put into production later this year.

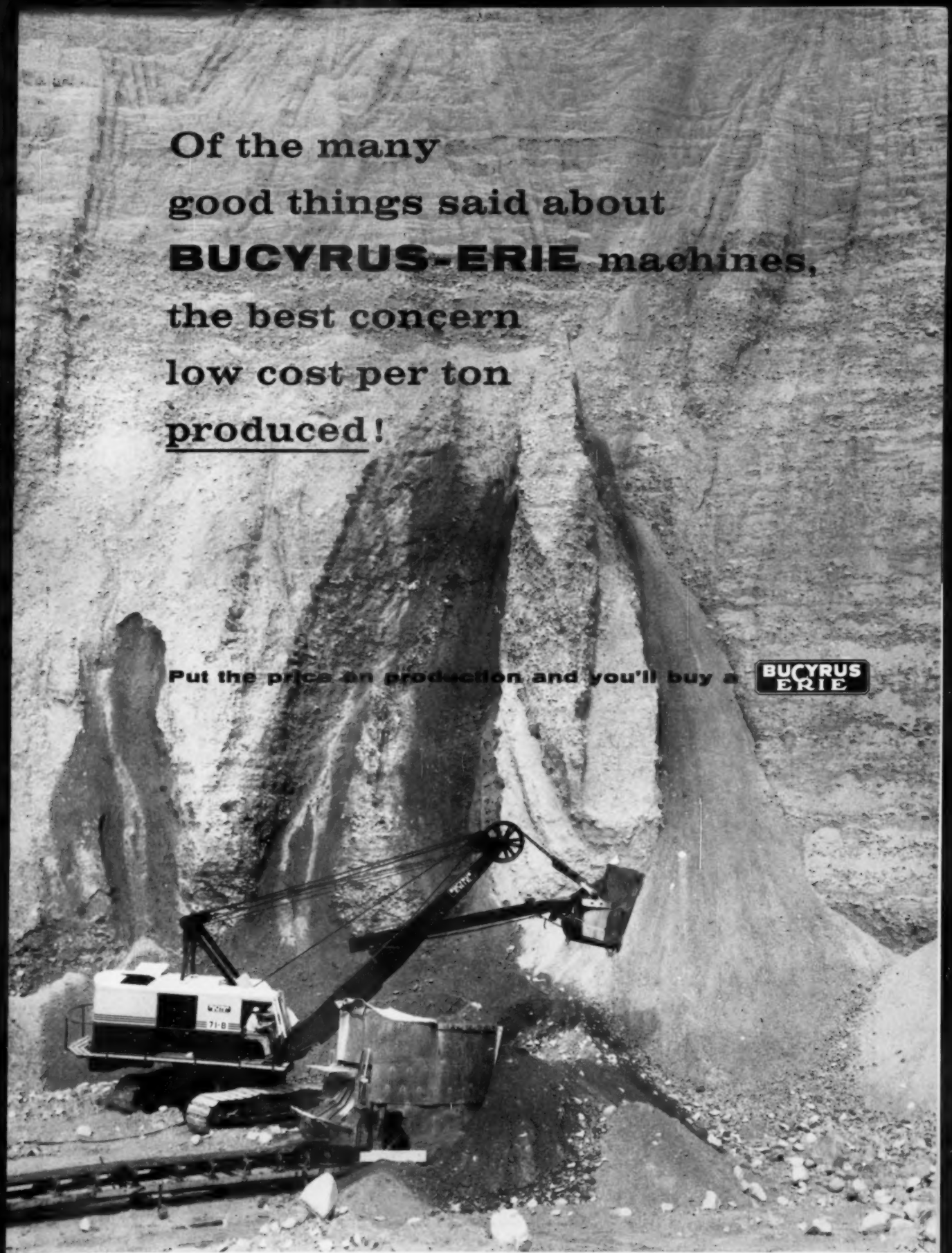
Approximately 1,000 persons at the show saw new models of crawler tractors, tractor shovels, tractor loaders, motor graders and giant motor scrapers pass in review in the largest display of construction machinery ever presented by Allis-Chalmers to its dealers as a group.

Major new models of construction machinery introduced included: a HD-21G tractor shovel specially designed for steel mill slag removal operations; a medium sized, 105-hp model 145-T motor grader; a TL-30 tractor loader featuring a lifting capacity of 25,000 pounds; and a new TS-160 motor scraper with a 13-ton carrying capacity.

In addition to the mobile review of the equipment, participants viewed the complete machinery line and exhibits on display in a huge tent one-eighth of a mile long. A tour of the firm's new service training center was also conducted.

The presentation was held on the grounds of Allis-Chalmers, local construction machinery manufacturing plant. The firm also manufactures construction machinery at Cedar Rapids, Iowa, and Beardstown and Deerfield, Ill., in the United States and at Essendine, England; Newcastle, Australia, and Milan, Italy, overseas.

Dual-engine Allis-Chalmers scraper has a total of almost 700 horsepower and a heaped capacity of 40 yards. It is all-hydraulic.



11E61

BUCYRUS-ERIE COMPANY, South Milwaukee, Wisconsin

NOT IN THE CONTRACT

The visiting Texan was taken by a friend to the top of the Mark Hopkins hotel in San Francisco to marvel at the view. As often happens, that evening the fog rolled in so thick it was as if a gray curtain had been drawn across the wide expanse of glass windows, blotting out a breathtaking view of the bay area.

"Over there," said the friend, "is the Golden Gate bridge. A marvelous sight—too bad the fog's so bad we can't see it. To your right is Alcatraz, which also is quite a sight from here if the fog wasn't so thick." The friend went on rattling off one sight after another that wasn't visible because of the overcast.

"Down in Texas," the visitor said finally, "we ain't got much scenery, but you shore can see it all!"

Two kittens were watching a tennis match. One turned proudly to the other and said: "My pop's in that racket."

A young accountant had been keeping steady company with a girl for five years. Doggedly he refused to pop the question. The girl was getting impatient.

One night the accountant took the girl out to a Chinese restaurant. She studied the menu and began telling her boy friend what she would care to eat.

"How would you like your rice," the boy friend asked, "fried or boiled?"

The girl looked at the accountant, took a deep breath, then said very slowly and distinctly: "Thrown."

"Brothers," said the preacher, "the subject of my sermon today is liars. How many in this congregation have read the 35th chapter of Matthew?"

Nearly all the hands in the congregation went up.

"You are just the people I want to talk to. There is no such chapter."

"He was in charge while the boss was on vacation . . . now he's trying to revive old friendships."

Customer: "Do you have any notions on this floor?"

Floorwalker: "Oh yes, madam, but we try to suppress them during working hours."

The recently married young thing was buying a chicken for hubby's dinner.

"Wanna pullet?" asked the butcher, looking over his stock.

"Oh, no, I'll just carry it," replied the bride cheerfully.

It was the first day of school, and the teacher explained to the class that if anyone had to go to the washroom, they should hold up two fingers. From the back of the room came the voice of a little girl: "How's that gonna help?"

Two friends meet. First friend: "Did you hear about Louie? Fell down dead right in the street."

Second friend: "Fell down dead right in the street, eh?"

First friend: "Yeah, broke his glasses and everything."

"I understand your grandmother is the old-fashioned type who still toils at a spinning wheel. Does she earn much?"

"Well, last night she won fifty dollars on one number."

Sunday school teacher: "And why did Noah take two of each kind of animal into the ark?"

Bright child: "Because he didn't believe the story about the stork."

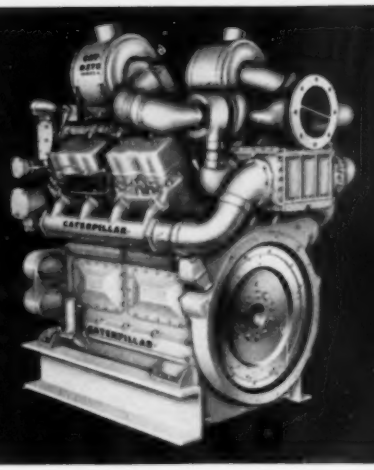
Lawyer: "Here's my bill for services. You can pay $400 down and $50 a month for the next 24 months."

Client: "Sounds like buying an automobile."

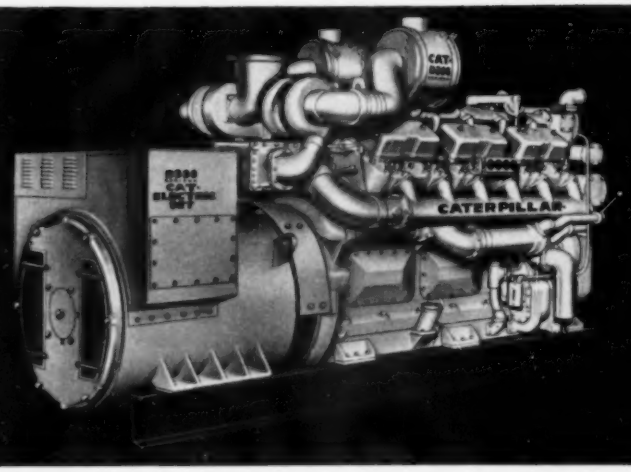
Lawyer: "I am."

engine power BY CATERPILLAR

new Cat D398-D379



Cat D379 Industrial Engine. The 6.25" bore, 8.00" stroke D379 and D398 both offer the latest in attachments including marine gears and generators. The D379 Electric Set develops up to 350 KW continuous, 400 KW standby.



Cat D398 Electric Set. The D398 Electric Set shown here with Static-Regulated, Static-Excited Generator features a new generator with built-in static excitation system with no exciter generator or vibrating parts. Develops 500 KW continuous, 600 KW standby.

Give more horsepower per pound, per dollar than any other industrial engine in their class

The V12 D398 and the V8 D379 are rated at 950 and 630 maximum HP, respectively. Electric set versions reach to 600 and 400 KW. Marine ratings exceed 1000 HP. These engines are now available at prices that are less than crankshaft replacement prices of some competitive engines in their class.

Published list prices show the D398 to be thousands of dollars less than the next lowest priced industrial engine that will develop comparable horsepower. Other advantages are quality aluminum alloy bearings, aluminum pistons with cast-iron ring band for top two compression rings, drop forged-dynamically balanced crankshaft and high strength rigid block. These engines save in space and weight, too . . . with at least 35-40% less size and 4800 pounds less weight than other makes with comparable horsepower.

Here are more reasons why Cat D398 and D379 Diesels and Electric Sets give you extra value

NEW PERFORMANCE STANDARDS

- Turbocharged-Aftercooled design
- Static-Regulated, Static-Excited Cat Generators
- High flow lube and water systems
- Ability to burn wide range of fuels

NEW ENGINE FLEXIBILITY

- 100% HP from either end of engines
- Six available accessory drives – up to 50 HP each
- Controls available for either side
- Standard (counterclockwise) rotation or opposite rotation

NEW SERVICE EASE

- Fuel or lube filters serviced from either side
- Remove heads without disturbing manifolding
- Easily inspect or remove pistons, rods and bearings through large side ports
- Externally mounted oil pumps for easy inspection and maintenance

For complete specifications on the D398 and D379 Diesel Engines or Electric Sets, contact your Caterpillar Dealer or Caterpillar Engine Division, Peoria, Illinois.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Caterpillar Tractor Co., Engine Division, Peoria, Illinois, U. S. A.

EQUIPMENT YOU OUGHT TO KNOW ABOUT

Hydraulic Push Dozers

Cushion action pushloading dozers that incorporate a single lift cylinder for hydraulic controls have been announced for the Cat D8 Series H and the D9 Series E tractors. They are designated No. 8C and No. 9C bulldozers.

A case-mounted cushion push block for the D8H and improvements to the 176 hydraulic control for the D8H, and the 184 hydraulic control for the D9E were announced concurrently.

The versatile cushion push dozers, available for the first time on the D8H, were developed by Caterpillar initially for the D9E to fill a gap between full time bulldozing work and strictly pushloading applications. The No. 8C and No. 9C bulldozers permit push tractor approach and contact with scrapers at relative speeds up to three miles per hour. The dozers are equally effective for smoothing the cut, haul road repairs and other normal dozing work.

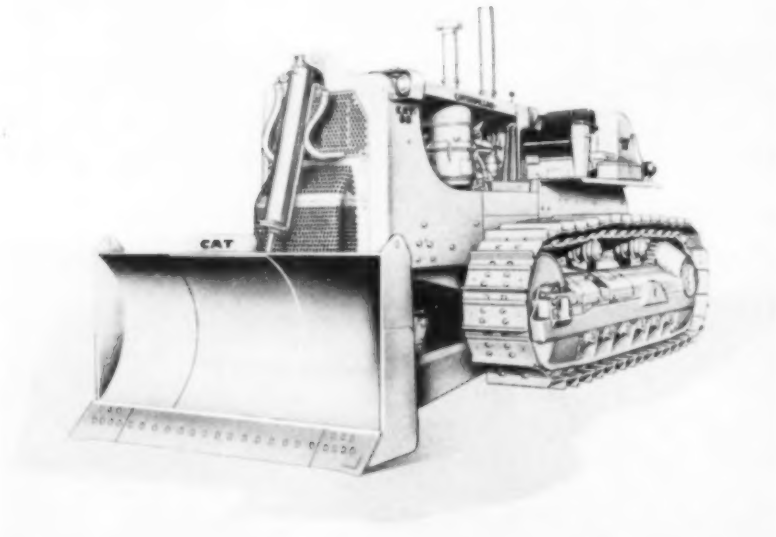
Use of the single lift cylinder gives operators greatly improved forward vision. It is mounted by pinning at the top center of the radiator guard. Cable controls also are available for the cushion dozers on both tractors.

The new dozers incorporate improvements that give more complete cushioning. This was accomplished by lengthening the travel distance before "bottoming" of the four rubber springs. Each spring is composed of eleven separate discs, which are made of a new and softer rubber compound. Compression resistance, the amount of pressure necessary to "bottom" the springs, is down to 84,000 pounds.

The cushion push block for the D8H tractor is mounted directly to the bevel gear case and is designed to permit installation along with the rear mounted No. 29 cable control. Compression resistance of the cushion push block is 110,000 pounds. Impact loading is absorbed by four rubber springs.

Two new valve arrangements are available for both the 176 and 184 hydraulic controls. One version is a single valve arrangement and the other is a double valve combination, permitting control of both the dozer and a rear mounted ripper.

Manufacturer: Caterpillar Tractor Co., Department EE, Peoria, Ill.



New Tractor Is Biggest

Allis-Chalmers has expanded its line of tractor loaders to six models with the introduction of the new TL-30. This four-wheel drive unit is the biggest in the line, and features a 10,500-lb. carrying capacity and a maximum lifting capacity of 25,000 pounds.

The loader is powered by Allis-Chalmers turbocharged "11000" diesel engine with a 184-hp rating at 2,200 rpm.

A single lever permits power shifting on the go at any speed and in either forward or reverse. Allis-Chalmers points out that single lever shifting lets the operator easily move into a stockpile and instantly drop into low crowding speed for full-capacity loading and reverse direction instantly.

Six buckets are available on the TL-30 ranging from 2½ to 6 cubic yards. Bucket and linkage design gives the unit a breakout force of up to 28,000 pounds and a 42° tip-back at ground level.

The TL-30 also features a maxi-

TRIAL SAMPLES
Of World-Famous WHITMORE'S Lubricants

OPEN CHAIN LUBRICANT INCREASES CHAIN LIFE UP TO 300%

Penetrates, lubricates, prevents rust. Lubricates deep into chain linkage to reduce friction on pins, rollers, bushings, pressure surfaces. Corrosion inhibitor prevents rust in vital working mechanisms. Lubricates close-tolerance internal surfaces to increase chain life up to 300%. Highly recommended for all climatic conditions to stop rust and corrosion even in salt atmospheres.

Packaged in handy 16 oz. aerosol spray-on containers or in bulk — send for a free trial sample.

ANTI-FRICTION COMPOSITIONS HAVE NO MELTING OR DROPPING POINT

Packaged in 14½ oz. cartridges for handy application with lever-type cartridge guns for constant protection to roller, ball, sleeve bearings and sliding surfaces in "hot" bearing applications or in areas with high ambient heat. Exclusive formulas have no melting or dropping point; moisture resistant; will not wash out; exceptional metal adherence properties; temperature reducing qualities; high extreme pressure values. Available in two grades. Whitmore's Anti-Friction Composition No. 1 (light density), recommended for high speed, high temperature applications. Anti-Friction Composition No. 2 (heavy density), for low-speed high-temperature applications or loosely-fitted bearings. Specify No. when requesting free trial sample.

68 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dipper Sticks, Cams
- Open and Enclosed Chain
- Speed Reducers
- Enclosed Gear Cases
- Roller, Ball and Sleeve Bearings
- Wire Rope and Cable
- Hydraulic Units, Torque Converters

PRESSURE PROOF

Est. 1893
THE WHITMORE MANUFACTURING CO.
LUBRICATING ENGINEERS
CLEVELAND 4, OHIO • VULCAN 3-7272

Loader
in A-C Line

mum dumping clearance of 10 feet, 4½ inches and a 37½-in. reach forward from the tires for center loading of high, wide truck bodies.

As on other A-C models, axles on the TL-30 are pin-connected directly to the frame with 2-in. diameter steel pins rather than automotive-type U-bolt connections.

Operator safety, comfort and convenience features include air service brakes, a mechanical parking brake, a six-way adjustable foam-rubber seat, power steering and 24-volt direct electric starting.

Among the attachments and accessories available are special buckets, lift fork, backfiller blade, bucket teeth, and log tongs. Special tires, hydraulic system accumulator, all-weather cab, heater and defroster are optional.

Standard tires are 18.00x25, 12-ply. Shipping weight of the TL-30 is approximately 28,400 pounds.

Manufacturer: Allis-Chalmers Mfg. Co., Department EE, Milwaukee, Wis.

100-Ton Capacity Crane

Manitowoc's improved model 3900 crane makes 100-ton lifts at 15-ft. radius. It is also fully convertible to dragline or clamshell applications. A new feature is a lightweight "inverted angle" boom made of a special new alloy. Simple boom insert connections with a single bolt at each joint permit fast in-the-field addition or removal of extra boom sections.

A new 3-piece counterweight is self-removed by the machine itself without the use of jacks, blocking or other cranes.

Other features include retractable high gantry which is easily raised or lowered by the boom hoist; automatic clutch throw-out limit stop for safe, close radius booming; independent boom hoist with air controls for greater handling precision; and independent swing which allows operator to boom, swing, and travel simultaneously.

Manufacturer: Manitowoc Engineering Corp., Department EE, Manitowoc, Wis.

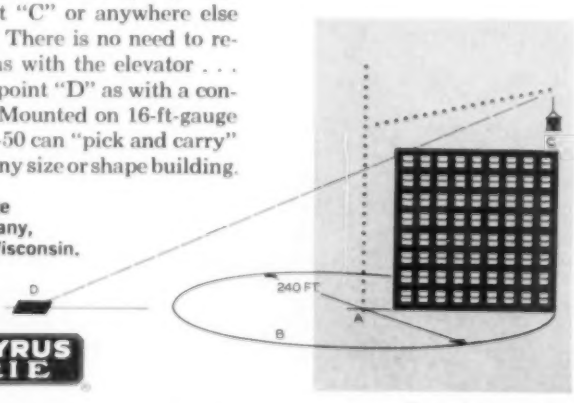
new tower crane measures up to highest hopes

The Bucyrus-Erie Mark I-50, the first American-built tower crane, has lived up to expectations—*and then some*—on its first job. Here are some of its accomplishments on the construction of a 15-story apartment building by Moss Construction in Los Angeles, California:

- ★ **It has cut six months from the original 18-month completion estimate.**
- ★ **It has cut labor costs by 24 percent.**
- ★ **It has eliminated concrete buggies and buggy runways.**
- ★ **Early completion has accounted for substantial savings in interest on borrowed money.**

This is how it works

The new Mark I-50 combines the reach of a truck or crawler crane with the vertical-lift feature of a construction elevator — then adds new advantages neither can match. It can stand at point "A," pick up a load from any spot within a 240-ft-diameter circle, "B," and deliver it to point "C" or anywhere else on the structure. There is no need to re-handle material as with the elevator . . . nor to back off to point "D" as with a conventional crane. Mounted on 16-ft-gauge track, the Mark I-50 can "pick and carry" to service almost any size or shape building.



For full details, write Bucyrus-Erie Company, South Milwaukee, Wisconsin.

BUCYRUS ERIE

most respected name in the field

1761

New Equipment . . .

Compact

Two new compact blasting machines are now offered by VME. These machines incorporate several long-sought-after features in high capacity condenser-discharge blasting machines. In size, the "VME Senior" has been reduced from 50% to 70% below that of blasting machines previously available. The weight has been reduced by approximately 50%.

The VME-Senior is a 450-volt rated blasting machine which weighs 15 pounds and has a recommended capacity of 50 caps in straight series for primary blasts, and 200 caps in straight series for secondary blasts. Fifty caps can be shot in straight parallel and 1,200 in series parallel arrangements.

The "VME-Junior" is rated at 225 volts and weighs 8 pounds. Its recommended capacity is 30 caps in straight series for primary blasts, and 100 caps in straight series for secondary blasts. In series parallel 240 caps can be shot. It is not recommended for straight parallel shooting.

Manufacturer: Vibration Measurement Engineers, Inc., Department EE, 725 Oakton St., Evanston, Ill.

Landclearing

Blasting Machines

The Most Advanced Dredges in Their Class

Ellicott "Dragon"® Model Portable Dredges

Here's why:

1. These are dredges in which portability is a reality not a possibility. *Patented* hull disassembles quickly and can be reassembled on shore or in the water.
2. All components are designed and built by Ellicott whose centralized engineering and manufacturing responsibility insures quality control.
3. "DRAGONS" are completely electro-hydraulically operated with unified controls to facilitate handling ease, lessen operator fatigue and raise outputs. *This kind of control was first introduced by Ellicott on portable dredges over 10 years ago.*
4. All precision machinery easily accessible for servicing Eliminates costly delay in maintenance of vital operating components.
5. "DRAGONS" are products of experience gained by a company which has concentrated on designing and building dredges of all types and sizes for 75 years. This know-how unequalled by any other dredge builder.

These and other exclusive Ellicott designed features spell out why today's rugged durable "DRAGONS" are recognized everywhere to be top performers as proved by their work on road construction, land reclamation, industrial pond clearance and waterway maintenance. To find out more about them, their accomplishments and how one is suitable for your construction operations, write for Bulletin 980.

Please fill in the handy coupon.

ELLICOTT DREDGES

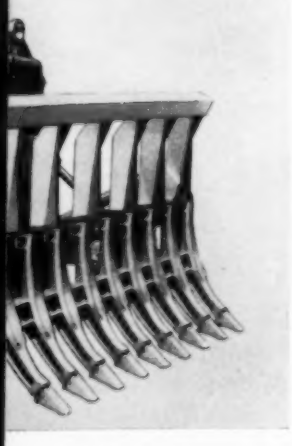
ELLICOTT MACHINE CORPORATION, Baltimore 30, Maryland, U.S.A.; Ellicott-Brandt, Inc., Baltimore, Maryland; Ellicott Fabricators, Inc., Baltimore, Md.; McConway & Torley Corp., Pittsburgh, Pa.; Timberland-Ellicott, Limited, Woodstock, Ontario, Canada; Dragues Ellicott France, Paris, France; Dragas Ellicott do Brasil Ltda., Rio de Janeiro, Brazil; Ellicott de Mexico, Mexico City, Mexico.
Successors to the floating dredge business of the Bucyrus-Erie Company and the American Steel Dredge Co. Complete engineering, design and construction service.

ELLICOTT

ELLICOTT MACHINE CORPORATION
1619 Bush Street, Baltimore 30, Maryland
Send me a copy of Bulletin 980, describing "DRAGONS," "The Ultimate in Portable Dredge Engineering."

Name_____
Firm_____
Address_____
City_____ Zone___ State_____

Rake Attachment



Width of rake ranges from 95 inches on the TD-9, to 151 inches on the TD-25. Weight of entire rake ranges from 1,405 pounds for the smallest rake to 4,580 pounds on the largest rig.

A Drott Mfg. Corp. landclearing rake attachment is available for all International Harvester tractors from the TD-9 through the TD-25. It may be used on cable or hydraulically operated bulldozers or angle-dozers. The attachment moves trees, stumps, rocks and boulders but leaves the immediate dirt in position. It is available with or without top brushguard. If job application requires only rock and stump removal, the brushguard may be omitted.

The rake features teeth cast of special manganese molybdenum steel individually mounted and adjustable to suit job specifications. On the bulldozer line, tooth pitch can be adjusted for uprooting stumps or raking action. Special replaceable tips are secured by means of a sleeve and roll pin for assurance against loss. A strut adjustment of approximately three inches can be made quickly on the "D" series rakes.

Manufacturer: Drott Mfg. Corp., Department EE, 3126 S. 27 St., Milwaukee 15, Wis.

Here's what you can buy for cancer research

Scan the list below. Read the actual prices of equipment purchased with American Cancer Society funds. You'll see that *there are never any bargains in cancer research.*

Decide what you can afford to buy. Then mail your contribution with the coupon below to CANCER, c/o your post office.

RESEARCH PRICE LIST

5 dozen tissue culture tubes . . . $5

Food and care of 1500 mice for 1 day $15

1 micrometer $19

1 mouth rebreathing apparatus and nebulizer $20

1 instrument sterilizer $50

1 blood cell calculator, used in leukemia studies $70

4 days' maintenance of a cancer research bed $100

1 kymograph manometer . . . $134

1 isotope scanner $250

2,000 millicuries of radioactive iodine $750

½ gram of cobalt for radiation research $6,000

1 grant for the study of the role of hormones in growth, including the cause, prevention and treatment of cancer $70,000

100 medical training fellowships for 1 year $500,000

Grants to 5 scientists, each heading a cooperative five-year cancer research program . . $1,000,000

Mail this coupon to:
CANCER
c/o Your local post office

Attached is my donation of $_____ to fight cancer.

My Name_____

Address_____

City_____

State_____

AMERICAN CANCER SOCIETY

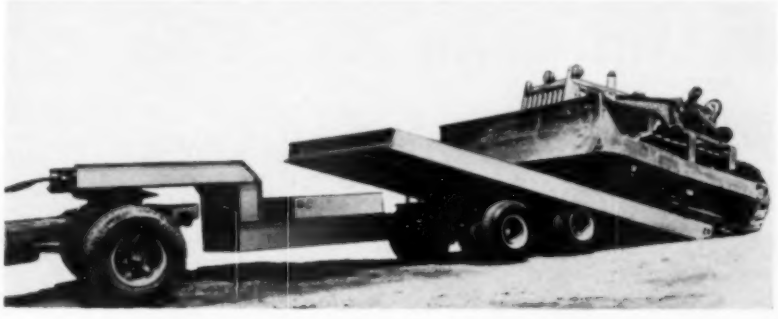
New Equipment . . .

Motor Grader Disk Harrows

Designed for Caterpillar No. 12 and No. 14 motor graders, a new Rome disk plowing harrow is expected to permit substantial savings on secondary road maintenance.

Spring-loaded lift links of the device can be attached to the motor grader's blade and scarifier lift arms, giving the operator complete control over the harrow's position and penetration. A 16-disk model with 12-in. disk spacing is used to scarify, mix and blend, aerate and pulverize materials in road construction; also in maintenance of unpaved roads. Another model, with 22 disk blades spaced 6 inches apart, is designed especially for oil roads.

Manufacturer: Rome Plow Co., Department EE, Cedartown, Ga.



Tilt-Loading Trailer

Faster, safer loading of large construction equipment formerly handled only on "low-boy" units is claimed for the Miller OTS semi-tilt trailer.

Large platform area and 22-ton capacity enable the trailer to handle such heavy units as International Harvester's TD-24 crawler tractor, the Allis-Chalmers HD-16, Caterpillar's D8, road graders and excavators up to 44,000 pounds gross weight.

Manufacturer: Miller Tilt-Top Trailer, Inc., Department EE, 468 S. 92nd St., Milwaukee 14, Wis.

TO ADVERTISE: All advertising in this section is payable in advance. Rate $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters. Count spaces and punctuation as one character each. Be sure to enclose the correct amount of money with your order. Rates and conditions subject to change without notice. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the listed address. If box number is used, mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

Marion model 5561 stripping shovel, 112-ft. boom, 57-ft. 9-in. effective handle, 48-ft. 10-in. over-all length of crowd handle, 40 and 47-cu. yd. dippers. Location Middle West. Write:

EXCAVATING ENGINEER
Box 3767 South Milwaukee, Wis.

Lima model 2400 dragline, 120-ft. boom, 7-cu. yd. dragline bucket. Cooper Bessemer STR-8 diesel engine. Air start auxiliary engine, light plant. Location western Pennsylvania. Write:

EXCAVATING ENGINEER
Box 3766 South Milwaukee, Wis.

Bucyrus-Erie model 750-B electric shovel with 95-ft. boom, 64-ft. handle and 12 cubic yard dipper. Some spare parts included. Location east central states. Write:

EXCAVATING ENGINEER
Box 3763 South Milwaukee, Wis.

EUCLIDS
Rear, Bottom and Scrapers

12-yd. Bucyrus-Erie dragline.
9-yd. Bucyrus-Erie dragline.
8-yd. Bucyrus-Erie shovel.
6½-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie shovel.
4-yd. Bucyrus-Erie dragline.
3-yd. Bucyrus-Erie shovel.
2½-yd. Bucyrus-Erie shovel and dragline.
1½-yd. Bucyrus-Erie shovel.
5-yd. Manitowoc shovels and drags.
6-yd. Lima dragline and shovels.
Large stripping shovels.
Other equipment available, not listed above.

WILLIAM LUBRECHT, III
Construction Equipment
311 W. Diamond Ave. Hazleton, Pa.
Phone: GLadstone 5-4041 or 5-0523

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

HEAVY EXCAVATION EQUIPMENT
DRAGLINES, SHOVELS, CRANES, DRILLS, TRUCKS

9-W B.E. Elec. Drag, 200', 8 yd. or 160', 10 yd.
9-W B.E. Diesel Drag, 165', 12 yd.
7-W B.E. Diesel Drag, 140', 7 yd.
7400 Marion Diesel Drag, 175', 13 yd.
7400 Marion Elec. Drag, 175', 12 yd.
625 Page Diesel Drag, 160', 9 yd.
631 Page Elec. Drag, 200', 8 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W B.E. Diesel Drag, 125', 6 yd.
2400 Lima Elec. Drag, 130', 6 yd.
2400 Lima Diesel Drag, 130', 6 yd.
7200 Marion diesel drag, 135' 5 yd.
4500 Manitowoc Drag, 120', 5 yd. & 140', 4 yd.
120-B B.E. Elec. Drag, 115', 5 yd.
71-B B.E. Crane with 160' boom.
3900, 3500 & 3000 Manitowoc Cranes.
111-M Marion Drag, 100', 4 yd.
1055 P&H Diesel Drag, 80', 4 yd.
1601 Lima 4 yd. Shovel/Drag.
1201 Lima Drag, 85', 3 yd.
54-B B.E. Drag, 80', 2½ yd.
5560 Marion 26 yd. Elec. Shovel.
5323 Marion 18 yd. Elec. Shovel.
190-B B.E. 8 yd. Elec. Shovel.
151-M Marion 7 yd. Elec. Shovel.
1600 P&H 6 yd. Elec. Shovels.
170-B B.E. 6 yd. Elec. Shovel.
4161 Marion 6 yd. Elec. Shovel.
2400 Lima 6 yd. Std. & H.L. Shovels.
120-B B.E. & 4121 Marion 4 yd. Elec. Shovels.
1055 P&H 3 yd. H.L. Shovel.
111-M Marion Std. & H.L. Shovels.
1201 Lima & 54-B B.E. Standard Shovels.
#6 Northwest 1½ yd. Standard Shovel.
Model T-650 REICHdrill Truck Mtd. Rotary & Down-The-Hole.
Ingersoll-Rand Truck & Crawler Mtd. Drillmasters.
Keystone #50 Truck Mt. Stardrill.
Euclid Trucks, Rr. & Bottom Dump; Dozers, etc.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton National Bank Bldg.
Hazleton, Pa. — GLadstone 5-3658

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

Bucyrus-Erie 170-B electric shovel. Located Anthracite region. Available immediately. Excellent condition. For further information write:

EXCAVATING ENGINEER
Box 3765 South Milwaukee, Wis.

Bucyrus-Erie electric 120-B. Combination shovel-dragline. Located Anthracite region. Excellent condition. Priced to sell. For further information write:

EXCAVATING ENGINEER
Box 3764 South Milwaukee, Wis.

9-W electric dragline—located eastern United States. Excellent condition. Priced for quick sale. Write:

EXCAVATING ENGINEER
Box 3769 South Milwaukee, Wis.

Marion 482 #6353
Marion 4161 #8197
Bucyrus-Erie 54-B Diesel #103533
Bucyrus-Erie 150-B shovel #106870
All equipment subject to prior sale.
Contact:

PICKANDS MATHER & CO.
Purchasing Department
700 Sellwood Building
Duluth 2, Minn.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

CRANE

Bucyrus-Erie model 51-B, 80' boom, long wide undercarriage, extra large counter weight, powered by Caterpillar diesel engine. Serial #D337, like new condition $50,000 FOB our yard, Chicago.

HARRY A. THOMPSON, INC.
228 North La Salle St.
Chicago 1, Ill.
Telephone STate 2-8722

DRAGLINES

L-50 Lorain 1-yd., Cat D318, long crawlers, 50' boom. Serial 23596. Excellent.
15-B Bucyrus-Erie ½-yd., standard crawlers, 35' boom. Serial 49464. Fair.
K Insley ½-yd., gas engine, long wide crawlers. Serial 3879. Completely rebuilt.

GRADERS

Cat 12 S/N 9K5009, electric start., all four rear tires recapped.
Galion 118 S/N MD17985 IHC UD-16A diesel, power steering, operators cab.

ATTACHMENTS

51-B Bucyrus-Erie Shovel Front with 2-yd. dipper. No deck machinery. Unused.
22-B Bucyrus-Erie hoe (straight boom). Used.
15-B Bucyrus-Erie center section 15' long. Unused.
Lima 34 swing-type fairlead. Unused.
15-B swing-type fairlead. Unused.

POWER SHOVEL CO.
4913 Massachusetts Ave.
Indianapolis 18, Ind.

IMMEDIATELY AVAILABLE

B-E model 120-B elec. shovel #46011 Westinghouse apparatus.
B-E model 120-B elec. shovel #58182 Westinghouse apparatus. (Machine #58182 includes dragline attachment)
B-E model 120-B elec. shovel #52553 G.E. apparatus.
B-E model 120-B elec. shovel #52555 G.E. apparatus.
B-E model 5-W dragline #609 diesel powered.
B-E model 5-W dragline #716 diesel powered.
Located in northeastern U.S.A., available for immediate inspection and delivery.
B-E model 200-W diesel dragline #735. Machine is presently located in Montana.

EXCAVATING ENGINEER
BOX 3760 SOUTH MILWAUKEE, WIS.

SMALL SHOVELS, CRANES DRAGLINES — UP TO 2½ YDS.

Bucyrus-Erie 54-B shovel #107758, Buda 6DC-1879 engine. Rebuilt.
Bucyrus-Erie 54-B shovel #51079, Buda engine model 6DC1879.
Bucyrus-Erie complete 54-B shovel attachment.
Four Caterpillar DW20 scrapers #11C880, 891, 892, 901, excellent condition.

W. I. CLARK CO.
P. O. Box 301 New Haven, Conn.
Tel. CH 8-2131

TRACTORS

Cat DW20's—checked over and rebuilt—good rubber.

Caterpillar 14A series D8's with 8A angle dozers and No. 29 C.C. Real good operating condition and several completely remanufactured.

Caterpillar D4 tractors—wide and standard gauge. All with dozers. Checked over—all in operating condition—some rebuilt.

Caterpillar model D6 tractor, 9U series, 6A dozer. Double drum rear cable control. Guarded up and with operators guard. Undercarriage components 50% good. Good operating condition.

International TD18A with Isaacson D.D. cable control and C frame. Tracks and running gear—10% $1,500

International TD18 182 series—late model. Hyd. angle dozer. Completely checked over and all necessary repairs made. New track links and rebuilt running gear. Excellent cond.

International TD-6, wide gauge, with new Holt free-spooling skidding winch. Holt hydraulic angle dozer, with front mounted pump. All the guards including overhead operator guard. This machine has been checked over and repaired as necessary. The appearance is very good. Is in good operating condition. The undercarriage averages 60% good $4,750

Caterpillar D6 tractor, 9U series, guarded up, good tractor or drawbar work....$2,500

Allis-Chalmers HD6G shovel loader, serial No. 2254 with 1½ cubic yd. bucket. Worked a total of 3,600 hours since new. Engine completely rebuilt with new liners, pistons, bearings, and head. Checked over master clutch back including final drives, pins turned. Roller and idlers built, very good operating condition.

Allis-Chalmers HD56 shovel loaders with new motors and like new running gear.

Cat #955 75 H.P. shovel loader with 1¾-yd. bucket. Good condition.

International TD-6 with track, crankcase, radiator guards, operator guard. Straight hydraulic dozer. Checked over, repaired. $2,250

Oliver Cletrac OC-6 tractor with guard equipment, rear mounted skidding winch, Holt hydraulic straight dozer, front mounted on hydraulic pump. All steel operator guard. Good operating condition.

Caterpillar D4 tractor, 60" gauge, 7U series, with track roller guards, radiator crankcase guards, all steel operator guard, rails, rollers, idlers rebuilt, steering and master clutch final drives repaired. No. 4A angle dozer with No. 44 hydraulic control. Also equipped with a LeTourneau skidding winch. Excellent operating condition.

Caterpillar D6 tractor, serial No. 9U 10943, with a 6A angle dozer, front mounted cable control, and Hyster Hyspeed skidding winch. Engine, master clutch, transmission, final drives, steering clutches, all checked and repaired as necessary. Undercarriage averages over 75% good. All guarded up including an all steel overhead operator guard.

Caterpillar D2 tractor, with No. 44 Caterpillar hydraulic control and 2A Caterpillar dozer. Roller guards. Over $2,100 put into this machine in repairs. In excellent operating condition.

Caterpillar D2 tractor, 5U series with 5-roller non-oscillating frame. Equipped with a new Teale bucket loader, ¾-yd. bucket, running gear averages better than 60% good. The machine has been completely through our shop and engine completely rebuilt including a new block.

Caterpillar #25 double drum cable control for D8 .....$1,000

SMALL SHOVELS, CRANES DRAGLINES — UP TO 2½ YDS.

Allis-Chalmers AD45 motor grader, late current model, tires better than 65% good, 13:00 x 24 rubber on all wheels, cab, cab heater, lights, scarifier, and 14' moldboard, all necessary repairs made, excellent operating condition. Used 35 months since new. $7,500

Adams #512 motor grader, diesel powered, 13:00x24 tires on all wheels, 12' blade, scarifier, cab w/heater, defroster. Good running condition $3,500

Adams #511 motor grader, diesel powered. Blade, scarifier, and cab $2,500

Wooldridge pull-type ripper for use behind D7 or D8, 2-teeth equipped with new shanks adaptors, and points, over $500 in repairs put into rebuilding this ripper.

LeTourneau No. H3C ripper, equipped with two teeth, two tips 50% good. Balance of ripper in good condition and complete with cable.

Carco GY-54 towing winch, 4HD10 or D7 tractors.

Isaacson heavy duty towing winch for D7 tractors.

Cat #24 front cable controls. Operating cond. $500 and up.

Hyster Hyspeed skidding winches $500 & up.

Cat D7 angle dozers .....$400 & up

SHOVELS

Bucyrus-Erie 22-B with 50' crane boom extra counterweight, Tagmaster tagline, powered with a Caterpillar D-318 diesel engine, mounted on a self-propelled Maxi carrier unit with 8 14:00 x 20 tires. Completely rebuilt $28,500

Bucyrus-Erie 22-B with 50' crane boom and extra counterweight, tagline. Powered with Caterpillar D318 diesel. Mounted on Maxi carrier w/8 14:00 x 20 tires. Rebuilt completely in our shops $28,500

Bucyrus-Erie 51-B 2-yd. shovel powered with a Buda diesel. Good operating condition. FOB Car $30,000

Bucyrus-Erie 38-B 1½-yd. shovel, 1½-yd. dragline. Good operating condition..$30,000

P&H ¾-yd. shovel, equipped with a 55-ft. crane boom, extra counterweight, tractor type tracks with 20-in. flat grousers, powered with a Chrysler industrial gas engine, three-speed transmission on the upper works. General appearance good $6,500

Barber-Greene model 840B—60 ton per hr. hot plant.

Barber-Greene model 82A heavy-duty paving machine with floating clean-up scraper 14" x 6'5" crawlers, multiple speed-up, notched spirals, 72 horsepower, UD9A International diesel engine. Heavy drive.

Gardner-Denver 105 cubic foot per min. Air compressor, trailer mounted. Good condition $2,250

Pioneer 6-ft. x 30-in. type A, 2-chain with flared sideboards, apron feeder, appears like new. Sells for $2,450 new. Used only 90 days $1,800

Galion 10-ton 3-wheel steel roller, powered with Buda gas engine, engine has been completely rebuilt. Front wheel repaired. Checked and repainted. Put over $1,200 into repairs. Good operating condition. 30-day guarantee $3,750

Portable sawmill on heavy timber base, 48-ft. double track, 6-ft. x 9-in. carrier with two knees, single dog, (carriage could be lengthened for long lumber) friction feed works, 56-in. circle saw, 48-in. flywheel, one live feed roll, 25½-in. flat pulley drive, 18-ft. tail rolls. Anti-friction bearings throughout major portion of mill. This is a heavy-duty portable mill ..$3,000

WESTMONT TRACTOR CO.
150 E. Spruce Missoula, Mont.
P. O. Box 1445

IMMEDIATELY AVAILABLE

1—Model 38-B (1½-cu. yd.) Bucyrus-Erie shovel & dragline, Cat. diesel	$ 41,500
2—Model 150-B (6-cu. yd.) Bucyrus-Erie shovels & dragline, electric	210,000 ea.
10—15-cu. yd. Euclid mod. 63TD end dumps	24,000 ea.
3—15-cu. yd. Euclid mod. 46TD end dumps	24,000 ea.
10—30-cu. yd. Athey mod. PW20 bottom dump trailers only	13,000 ea.
12—30-cu. yd. mod. MX30 Southwest bottom dump trailers	5,000 ea.
10—DW20 Cat tractors w/30-cu. yd. mod. 137W Euclid bottom dump trailers	36,500 ea.
4—D9 Cat tractors w/PCU's & dozers, 18A Series	26,500 ea.
6—D8 Cat tractors w/PCU's & dozers, 14A Series	16,500 ea.
2—Mod. 33LDT Euclid pneu. tired scraper units	27,000 ea.
10—DW20 Cat scraper units w/modified bowls	27,000 ea.
1—6'x 6' "Special" D. D. sheepsfoot tampers, U.S.B.R. Specs.	7,500
1—6'x 16' Koehring smooth faced sealing roller, 50,000#	3,500
2—Mod. 200 Rex double Pumpcretes, electric	7,500 ea.
2—60"x 20' Link-Belt H. D. mang. apron feeders w/drives	12,500 ea.
1—6'x 12' Tyler F800 single deck screen w/drive	6,000
Approx. 2 miles 42" and 48" channel frame conveyor system in flights of 150' to 1885'	Price on application

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MOTOR GRADERS

Adams model 512 motor grader with 13.00 x 24 tires front and rear, cab, scarifier, lights, heater, defroster, windshield wipers, power steering, snow plow and wing. Engine overhauled recently. Price: F.O.B. Lansing $6,250

Austin-Western Master 99 motor grader, cab, windshield wipers, scarifier, lights. Price: F.O.B. Detroit $8,650

Adams model 610 grader, 14.00 x 24 tires front and rear, cab, scarifier, power steering. Price: F.O.B. Lansing $7,900

SCRAPERS-ROOTERS

LeTourneau-Westinghouse model "C" Tournapull with cab and 24" tires front and rear. #GT 4434. Price: F.O.B. Detroit. $12,000

LeTourneau-Westinghouse model "D" Tournapull, 18.00 x 25 tires front and rear. Price: F.O.B. Detroit $8,500

LeTourneau-Westinghouse model S3 rooter. Like new condition. For use with tractor of 50 hp or more. Price: F.O.B. Detroit. $1,000

MISCELLANEOUS

Littleford model 115 Tankar Heater. Price: F.O.B. Lansing $950

Layne-Northern pump, capacity 1,200 gpm @ 250 feet, 100-hp electric motor, 200' casing, 21 pieces tubing and 21 pieces drive rod. Price: F.O.B. Detroit $2,000

10-ton stiff leg derrick, requires 50-75-hp electric motor. Price: F.O.B. Lansing $2,000

LeTourneau-Westinghouse model "C" Tournapull w/P19 scraper. Price: F.O.B. Lansing $13,500

Warner & Swasey 36" push type rehandling bucket. Price: F.O.B. Detroit, Mich. ..$400

Warner & Swasey Gradall, Minneapolis-Moline gasoline engine on upperstructure. Duplex 4 x 6 carrier. Good condition, serial #NP 26690. (Model 2460). Price: F.O.B. Lansing $7,500

TRACTORS

TD9 International crawler tractor with Bucyrus straight bulldozer blade. Good tracks, cleaned and painted. Price: F.O.B. Detroit $5,000

Caterpillar DW10 rubber tired tractor. Price: F.O.B. Lansing $3,500

Oliver OC3 crawler tractor. Price: F.O.B. Detroit $2,000

Used A-C model HD21A crawler tractor, serial #8483, with Garwood bulldozer. Rebuilt in the fall of 1960. Price: F.O.B. Lansing $15,000

TELFORD EQUIPMENT CO.
Detroit, Mich. — **Ph. WEbster 3-7330**
Lansing, Mich. — **Ph. IVanhoe 4-1468**

Bucyrus-Erie 71-B shovel, GMC 6-110 engine, 3 cu. yd. Amsco bucket s/n 116168, located at Williams, Ariz. $70,000

Bucyrus-Erie 54-B shovel/crane, Buda 6DC 1879 engine, s/n 60319, located at Aurora, Colo. $28,000

Bucyrus-Erie 54-B shovel/crane, Buda 8DA 1125 engine, s/n 111968, located at Aurora, Colo. $33,000

Bucyrus-Erie 54-B dragline, Buda 6DC 1879, s/n 24654, located at Leesburg, Ala. ..$22,500

Manitowoc 4500 crane, 140' boom, Cat D397 engine, straight 48" clutch, s/n 4589, located at Leesburg, Ala. $135,000

Northwest model 6 shovel/dragline, model ME-6 engine, s/n 6827, located at Gallup, N. M. $17,000

Manitowoc 4500 shovel attachment, located at Boise, Idaho $30,000

INTERMOUNTAIN EQUIPMENT CO.
P. O. Box 1129 — **Boise, Idaho**
Phone: 3-6441

51-B HOE and DRAG Comb.

Bucryus-Erie 51-B combination with backhoe and dragline fronts. 70' boom. 3 yard Page bucket. Cat power with torque converter. Long, wide crawlers. 1957 machine and in A-1 condition.

POWER SHOVEL CO., INC.
4913 Massachusetts Ave.
Indianapolis 18, Ind.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

BUCYRUS-ERIE 38-B

Heavy-duty lifting crane, powered by Caterpillar D326F diesel engine with torque converter. 110' boom, mast pendant suspension, 12-part tackle, 30' jib, boom stops. This machine is nine months old and can be bought for approximately 70% of the new price.

D. D. KENNEDY, INC.
P. O. Box 177
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Chicago: AUstin 7-4300
Suburban: LInden 4-5600

Bucyrus-Erie 22-B, s.n. 116765 GMC 3-71 with torque converter, as shovel, hoe or crane. $15,000. Good cond.

PARK-WARD CO.
345 Comm. Exchg. Bldg.
Oklahoma City, Okla.
Ph. CE 6-8889

Bucyrus-Erie model H-5 Hydrocrane, serial No. 119382, complete with tagline reel, ½-cubic yard GP clamshell bucket, mounted on ten-wheel International truck chassis. Entire unit sold new in 1959. Very low hours. Like new condition throughout.

Bucyrus-Erie model 15-B, serial No. 33505 with AC model HB351 gasoline engine, ½-cu. yd. hoe, 16" treads, standard crawlers. Currently being rebuilt in our shop.

Bucyrus-Erie model 22-B, serial No. 116958, with Caterpillar D315 diesel engine, ¾-yd. cambered boom backhoe, 26" treads with 12'-0-⅜" crawlers. Currently being rebuilt in our shop.

Bucyrus-Erie model 22-B, serial No. 105975, with Caterpillar D318 diesel engine, 26" treads with 12'-0-⅜" crawlers. Any or all attachments available. Machine currently being rebuilt in our shop.

Bucyrus-Erie model 51-B 2½-yd. shovel, serial No. 62581, with Caterpillar D17000 diesel engine, standard crawlers with 36" treads. Low hours. Reconditioned and in very good condition throughout.

Lorain Model TL-25 ¾-yd. cambered boom backhoe with 3-71 General Motors diesel engine, extended crawlers, wide treads. Machine delivered new in 1956. Undercarriage rebuilt this year. Good working condition throughout. As inspected.$10,500

P&H model 255, serial No. 10784 ¾ cubic yard shovel with eight cylinder Chrysler engine. Appearance excellent. Good working condition throughout. Location—Watertown, Conn. "As is" $4,000

¾ cubic yard cambered boom backhoe attachment also available. Price $2,000

Koehring model 304, serial No. 8624 ¾ cubic yard backhoe with International UD14 diesel engine. Good working condition. "As is" $5,000

P&H truck crane, model 155ATC, serial No. 18206, 30' boom with clamshell equipment less bucket. Good condition throughout.

Lorain model L50K, serial No. 25389, Cat D318 diesel engine, extended crawlers with 30" treads, independent power boom hoist, 1-cu. yd. shovel front with AMSCO dipper. Other attachments available. Good condition throughout.

Northwest model 6, Serial No. 13260, with Murphy diesel engine, extended crawlers, independent power boom hoist, 1½-yd. cambered boom backhoe attachment, 45-ft. crane boom, pendant suspension with high gantry. Appearance excellent. Currently being rebuilt in our shop.

Bucyrus-Erie Hydrohoe Attachment for H-3 Hydrocrane with 18" general purpose dipper, 20" utility dipper, 12" narrow dipper and all neecssary fittings. Excellent condition $750

Bucyrus-Erie model 15-B shovel front complete with dipper trip, chains and lagging $1,200

Bucyrus-Erie model 22-B shovel front complete with dipper trip, chains and lagging. Good condition $1,500

Lorain ¾-yd. shovel front, Amsco bucket complete with dipper trip. Excellent condition throughout $1,500

Bay City model 45 ¾-yd. shovel front complete with dipper trip. Good condition. $1,500

BINDER MACHINERY CO.
Brighton St., Union, N. J.
MUrdock 8-0060

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

CRANES—HOES

Bucyrus-Erie 22-B, S/N 11383, w/Cat D318 eng., ¾-yd. hoe, 26" tracks, work order of $6,000. *CERT. BUY.* Reg. $16,500; terms and trade $14,850; cash and no trade $13,200.

Bucyrus-Erie 22-B, S/N 116767, w/Cat D318 engine, ¾-yd. hoe, 26" tracks, work order $10,000. *CERT. BUY.* Reg. $16,500; terms and trade $14,850; cash and no trade $13,200.

Four Bucyrus-Erie 15-B machines, S/N 113582, S/N 114550, S/N 116616, S/N 117081. All equipped w/D315 engines, 20" tracks, ½-yd. hoe, work order $6,800 per mach. *CERT. BUY.* Reg. $15,500; terms and trade $13,950; cash and no trade $12,400.

Unit 510 mobile crane, S/N 5[illegible]3, w/Chrysler 16A eng., Challenger 6x6 carrier, ½-cu. yd. hoe. *As is.* Reg. $14,500; terms and trade $12,325; cash and no trade $10,150.

PIPELAYERS

Two Cat 572 pipelayers, S/N 21A280 and S/N 21A281, w/booms and counterweights. Both machs. approx. 1,000 hours ea. *CERT. BUY.* Reg. $30,000 ea.; terms and trade $27,000 ea.; cash and no trade $24,000 ea.

Cat MD8, S/N 2U11530, w/pipelayer and weights. Rebuilt, work order $6,500. *As is.* Reg. $12,500; terms and trade $10,625; cash and no trade $8,750.

Cat MD7, S/N 3T12124, w/pipelayer, boom and weights. Rebuilt, work order $4,076. *As is.* Reg. $13,500; terms and trade $11,475; cash and no trade $9,450.

Cat MD7, S/N 17A2243, w/pipelayer, boom and weights. Rebuilt, work order $3,000. *BONDED BUY.* Reg. $16,500. Terms and trade $15,675; cash and no trade $14,850.

International TD-18, S/N TDR14069, w/boom and weights. Rebuilt, work order $1,509. *As is.* Reg. $4,000; terms and trade $3,400; cash and no trade $2,800.

MISCELLANEOUS

Cat D7, S/N 17A8194, w/2 Lincoln Twin Arc welders tractor engine driven, Hyster D7N winch. *As is.* Reg. $19,500; terms and trade $16,575; cash and no trade $13,650.

Cat D7, S/N 3T24024, w/2, Lincoln Twin Arc welders and Cat D315 generators, oil clutch. *As is.* Reg. $14,000; terms and trade $11,900; cash and no trade $9,800.

Hyster grid roller, S/N 1666, used for demonstration only. *BONDED BUY.* Reg. $6,800; terms and trade $6,460; cash and no trade $6,120.

ALBERT & HARLOW, INC.
6501 E. Admiral Place — **P. O. Box 15800**
Admiral Station — **Tulsa, Okla.**

Bucyrus-Erie 54-B shovel, Bucyrus-Erie 44-B shovel, Bucyrus-Erie 43-B shovel, Bucyrus-Erie 43-B dragline. Located in eastern United States. Write:

EXCAVATING ENGINEER
Box 3768 — **South Milwaukee, Wis.**

1—Northwest shovel model 70, serial number 4109 with 2½-yd. bucket, Cummins diesel engine, also spare parts.

2—10" Allis-Chalmers Superior reduction crushers.

1—Traylor model TZ gyratory crusher.

3—Ingersoll-Rand FM-3 wagon drills.

NEW YORK TRAP ROCK CORP.
162 Old Mill Road
West Nyack, N. Y.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

DRAGLINES

38-B Bucyrus-Erie, 1½-yd., Cat D13000 diesel engine, long cats, 33" treads, 1953, 50' boom, dragline fairlead, very good condition.

30-B Bucyrus Erie, 1¼-yd., Cat D318 Diesel engine, long cats, 36" treads, 1959 rental and demo machine, 60' boom, fairlead, like new, discounted.

22-B Bucyrus-Erie, ¾-yd., G.M.C. 3-71 diesel engine, 12' long crawlers, 26" treads, 1948, crawlers rebuilt, fairlead, good condition.

22-B Bucyrus-Erie, ¾-yd., Buda K-428 gas engine, 12' long crawlers, 26" treads, 50' boom, 1955, dragline fairlead, overhauled, excellent.

45 Bay City, ¾-yd., Cat D4600 diesel engine, dragline fairlead, 45' boom, long crawlers, 26" treads, good working condition.

SHOVELS

22-B Bucyrus-Erie, ¾-yd., G.M.C. 3-71 diesel engine, 1948, 26" crawler treads, crawlers rebuilt, machine in good operating condition.

29-B Bucyrus-Erie, 1-yd., Cat diesel engine, machine in very good condition, 1-yd. shovel dipper, $2,000 in extra parts included, priced to sell.

34 Lima, ¾-yd., Cat D318 diesel engine, machinery overhauled and in excellent condition, cab panels sandblasted and repainted.

375 American, ¾-yd. shovel, Waukesha gas engine, needs some work but would make a standby or extra shovel for limited loading. Cheap.

K-12 Insley, ½-yd. Buda gas engine, lots of work left in this one at a giveaway price, buy as is or we will repair to suit purchaser.

30-B Bucyrus-Erie, 1-yd., Cat. D-318 diesel engine, 1959, rental and demonstration machine in like new condition, discounted for rental use.

BACKHOES

38-B Bucyrus-Erie, 1½-yd., Cat D13000 diesel engine, 1953, long cats, 33" crawler treads, 1½-yd., hoe dipper, overhauled in November, excellent.

30-B Bucyrus-Erie, 1 to 1½-yd. dippers available, Cat D318 or G.M.C. 4-71 diesel engines, rental and demonstration machines, excellent, discounted.

22-B Bucyrus-Erie ¾-yd., Cat D318 diesel engine, 1955, long crawler frames with 30" treads, excellent condition, low hours, priced right.

K-12 Insley, ½-yd., Buda gas engine, needs some work but has been producing right up to trade in time. Bargain.

LIFTING CRANES

30-B Bucyrus-Erie, Cat D318 diesel engine, long crawler frames with 36" treads, pendant suspended boom available up to 100', demonstration and rental machine at a big reduction.

357 Unit wagon crane, 7-ton capacity, Chrysler gas engine, machinery overhauled, cab panels sandblasted and repainted, excellent condition.

30-B Bucyrus-Erie Maxi-mounted wagon crane, 35-ton capacity, 55' boom, G.M.C. 4-71 diesel engine, independent propel, dragline fairlead, tagline reel, hydraulic tow bar, 14.00 x 24 tires, 1,500 hours, an excellent machine at a big reduction in price.

14-B Bucyrus-Erie truck crane, 6-wheel drive carrier, 60' of hydraulic telescoping boom, outriggers with screw jacks and floats, a like new machine with a demonstrator discount.

"L" Quickway truck crane, 10-ton capacity, 80' of boom and jib, heavy-duty 15-ton carrier, gas power in crane, front and rear outriggers, very good condition and priced to sell.

HYDROCRANE EXCAVATORS

H-2 2 ton capacity, mounted on I.H.C. truck chassis, rear hydraulic outriggers, telescoping boom, priced to sell at $2,000.

H-3 5-ton capacity, 1952, mounted on Ford truck chassis, operator's cab, tandem outriggers, telescoping boom, hydraulics overhauled.

H-3 5-ton capacity, self powered with a new Continental gas engine, new pumps, overhauled hydraulics, mounted on G.M.C. 1951 upper on 1953 truck, operator's cab, tandem outriggers.

H-3 5-ton capacity, self-powered with 4-cylinder Ford engine, hydraulics overhauled, operator's cab, tandem outriggers, tagline reel, clamshell bucket, hoe attachment available.

H-3 5-ton capacity, telescoping boom, tandem outriggers, hydraulics overhauled, mounted on 6-wheel drive carrier, tagline reel and bucket.

See us for rental cranes and shovels. Bucyrus-Erie dragline buckets. Used booms and Buckets.

J. P. WAITE, INC.
3304 W. Pierce St. EV 4-1900
Milwaukee 15, Wis.

Northwest 25 dragline with 40' boom, and IHC UD-14A diesel engine. Serial #11190. Price FOB Greensboro, N. C. $10,500

Northwest 25 dragline with 40' boom, and Caterpillar D318 diesel engine. Serial #16215. Price FOB Greenville, N. C. .$9,750

Lorain TL-25S shovel with Caterpillar D315 diesel engine. Serial #25164. Price FOB Charlotte, N. C. $8,000

Link-Belt K-580 2½-yd. shovel with Caterpillar D17000 engine. Serial #2733. Price AS IS, WHERE IS, near Greensboro $18,500

Allis-Chalmers TS-160 motor scraper. Serial #620. Price FOB Greensboro $20,000

E. F. CRAVEN CO.
Greensboro, N. C.
P. O. Box 3307 515 S. Eugene St.

Bucyrus-Erie 51-B dragline, S/N 117039, w/80' boom, pendant suspension, torque converter, 14,000# counterweights, long and wide tracks, 36" pads, powered with "Cat" 337F diesel engine. Very good condition throughout. Also have 2-yd. Hendrix dragline bucket.

Esco ¾-yd. orange peel model 379. Excellent. $2,125.

American double-drum sheepsfoot roller, model AD96 with wedge type feet, 48" width drums, diameter 60" good condition. $2,000.

Model 25 Northwest backhoe, ¾-yd. Caterpillar D4600 engine, very good condition. $10,750.

Model 300 International tractor with Wain-Roy backhoe, model H-700, 12" bucket, both 1956 models, $3,750.

Wooldridge model BB120, 14 to 18-yd. scraper, tires 18.00 x 24 65% of new. Scraper in good condition. $2,500.

Model C Scoopmobile with 22' tower and pallet forks, with ¾ yard bucket excellent condition. Chrysler gasoline engine. Capacity 4,000 pounds. $3,900.

Model 25 Bay City shovel, dragline, backhoe, combination, serial No. 6465, 1952 model, Caterpillar 315 engine, very good condition, $10,800 with any one front. Add $1,250 for each additional front.

Bucyrus-Erie 15-B—½-yd. dragline, standard tracks 16" treads, 35' boom, very good condition throughout. 1959 model with less than 2000 hours. $15,925.

K-12 Insley dragline with 45' boom, fairleads. Serial No. 11289, 1955 model, Buda 326 gasoline engine. Machine in good condition throughout. $8,500.

Carver KN10L 10" centrifugal pump, Continental model B427 gasoline engine, 80-hp 6-cylinder, 1,800 rpm, with 10' suction hose, 20' of intake pipe, 60' discharge pipe, mounted on trailer.

3-W Bucyrus-Erie dragline, 80 ft. boom, HRS Cummins diesel engine, 4-yd. Hendrix bucket, spare parts $27,500. Good condition.

Caterpillar 933 hiloader, good condition.

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1—Northwest 25 dragline, Cat 4600 engine, 35' boom, fairlead. Serviceable as is.

1—Link Belt LS-71 dragline, IHC UD-14A engine, 45' boom, fairlead. Repaired, cleaned and painted, priced to sell.

1—Lima 604 dragline, Cummins HIS engine, 50' boom, fairlead. A serviceable machine, checked, cleaned and painted.

1—Lima 34 dragline, Cat 318 engine, 35' boom, fairlead, workwise and serviceable.

1—Quickway model "L" trench hoe, IHC U-9 engine, mounted on FWD commercial chassis, single rear axle. A clean machine and carrier. Need a good dependable rig?

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1—Bucyrus-Erie model 22-B shovel attachment complete, good condition—a bargain.

1—Bucyrus-Erie model 120-B dragline attachment complete, fairlead and deck equipment. Good condition.

1—Quickway model "L" dragline, crane attachment, complete, fairlead, 30' boom, pin connected, pendant suspension, ½-yd. Quickway drag bucket.

1—Quickway model "L" shovel attachment complete, good condition.

1—Wellman, 1-yd. drag bucket, size 201, model DXL, repaired, ready to go to work.

1—Lima 604 shovel attachment complete, good condition, serviceable as is.

1—Kiesler 2½-yd. clamshell bucket type "H", good condition.

1—Lima 34T hoe attachment, 30" dipper. Excellent condition.

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5—1958 Caterpillar model 583 sidebooms
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2—Cleveland model 320 trenchers
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6—1958 International model A120 4x4 pickup trucks

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1—Foote Kinetic Mixer model EM
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1—Lima roadpacker
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2—Caterpillar DW20's, turbo-charged engines. Serviced, cleaned and painted. Rubber good.

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MISCELLANEOUS

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American 375 ¾-yd. backhoe, 3-71 GM diesel.

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Northwest 25 ¾-yd. dragline, Cummins diesel.

Insley K12 ½-yd. dragline and backhoe, Waukesha gas engine.

Unit 614 ½-yd. dragline, Chrysler 8 gas engine.

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Bucyrus-Erie H-3 Hydrocrane excavator. Has tagline reel and ¾-yd. clamshell bucket. Ready to go. Price: $4,500.

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MISCELLANEOUS

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Bucyrus-Erie 22-B dragline, 35' boom, Cat diesel engine, s/n 92141, reconditioned.
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Northwest 25 backhoe, s/n 17808, reconditioned.
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Blaw-Knox ⅜-yd. clamshell bucket #H8808.

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Adams 512, S/N 6027, w/scarifier, 13:00 x 24 tires. *As is*. Reg. $4,750; terms and trade $4,033; cash and no trade $3,325.
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MISCELLANEOUS EQUIPMENT

TRACTORS

Cat D9, S/N 19A866, w/push plate, #9 ripper, complete rebuild. *CERT. BUY.* Reg. $35,000; terms and trade $31,750; cash and no trade $28,000.

Cat D9, S/N 19A285, w/9A dozer, #30 C.C.U. Kelly ripper, $12,000 work order. *BONDED BUY.* Reg. $47,500; terms and trade $45,125; cash and no trade $42,750.

Cat D9, S/N 19A208, w/C frame and push cup; #29 C.C.U.; rebuilt eng., new crank shaft. *CERT. BUY.* Reg. $38,500; terms and trade $34,650; cash and no trade $30,800.

Cat D9, S/N 18A1615, w/9A dozer, #30 C.C.U., rebuilt eng. and undercarriage. *CERT. BUY.* Reg. $38,750; terms and trade $34,875; cash and no trade $31,000.

Cat D8, S/N 2U20285, w/8S dozer, #24 C.C.U., C.C. guard, pull hook. *As is.* Reg. $14,000; terms and trade $11,900; cash and no trade $9,800.

Cat D8, S/N 15A2297, w/8A dozer, #29 C.C.U., $8,500 work order on comp. Rebuild. *CERT. BUY.* Reg. $19,500; terms and trade $17,550; cash and no trade $15,600.

Cat D8, S/N 15A970, w/8S dozer, #29 C.C.U., work order of $6,500 on comp. rebuild. *BONDED BUY.* Reg. $26,000; terms and trade $24,700; cash and no trade $23,400.

Cat D8, S/N 36A1839, w/8S dozer, #29 C.C.U., 1,816 hours. *CERT. BUY.* Reg. $32,500; terms and trade $29,250; cash and no trade $26,500.

Cat D7, S/N 17A5541, w/7S dozer, #46 hyd. control, 22-in. grousers, 3,800 hours, 70% remaining undercarriage. *CERT. BUY.* Reg. $16,500; terms and trade $14,850; cash and no trade $13,200.

Cat D7, S/N 11060, w/7A dozer, #24 C.C.U., 1958 model, low hours. *CERT. BUY.* Reg. $15,500; terms and trade $13,950; cash and no trade $12,400.

Cat D7, S/N 11066, w/7A dozer, #24 C.C.U., Hyster D7D towing winch. Repair work order over $6,000. *CERT. BUY.* Reg. $17,000; terms and trade $15,300; cash and no trade $13,600.

Cat D7, S/N 3T22307, w/7S dozer, #25 C.C.U., repaired for good operating condition. *As is.* Reg. $8,750; terms and trade $7,437; cash and no trade $6,125.

Cat D7, S/N 17A12950, w/7S dozer, #46 hyd. control, oil clutch, 2,300 hours. *BONDED BUY.* Reg. $18,500; terms and trade $17,575; cash and no trade $16,650.

Cat D6, S/N 9U4466, w/6S dozer, #46 hyd. control, completely rebuilt. *CERT. BUY.* Reg. $9,500; terms and trade $8,550; cash and no trade $7,600.

Cat D6, S/N 8U5499, w/6S dozer, #46 hyd. control, completely rebuilt, work order over $7,500. *CERT. BUY.* Reg. $8,500; terms and trade $7,650; cash and no trade $6,800.

Cat D6, S/N 9U22673, w/6S dozer, #46 hyd. control, rebuilt eng. and final drives. *BONDED BUY.* Reg. $13,500 terms and trade $12,825; cash and no trade $12,150.

Cat D4, S/N 7U8713, w/4S dozer, #44 hyd. cont., rebuilt diesel and starting eng. *CERT. BUY.* Reg. $4,000; terms and trade $3,600; cash and no trade $3,200.

International TD-24, S/N TDC241-1332, w/S dozer, cable cont., hyd. ripper, eng. and torque converter rebuilt. *As is.* Reg. $16,500; terms and trade $14,025; cash and no trade $11,550.

Cat D4, S/N 7U42560, w/4S dozer, #44 hyd. cont., 5-roller frame, 16-in. grousers. *BONDED BUY.* Reg. $10,500; terms and trade $9,975; cash and no trade $9,450.

International TD24, S/N TD241-10137, w/S dozer, cable cont. *As is.* Reg. $10,500; terms and trade $8,525; cash and no trade $7,350.

International TD-18A, S/N TDR29984, w/A dozer, hyd. cont., 20-in. track. *As is.* Reg. $5,500; terms and trade $4,675; cash and no trade $3,850.

International TD-14, S/N TD142-43187, w/S dozer, hyd. cont., (tilt type), 1,850 hours. *CERT. BUY.* Reg. $9,500; terms and trade $8,550; cash and no trade $7,600.

Allis-Chalmers HD-11, S/N HD11 B3656, w/A dozer, hyd. cont., 20-in. grousers, undercarriage and eng. have been rebuilt. *As is.* Reg. $9,500; terms and trade $8,075; cash and no trade $6,650.

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6501 E. Admiral Place **P.O. Box 15800**
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MISCELLANEOUS EQUIPMENT

Bucyrus-Erie model 27-T drilling machine, serial No. 46051, complete with a No. 8 bit dressing machine, serial No. 46050. This machine is track mounted, electrically powered using 440 volt, 3 phase electricity, and is in good general condition. The machine is self-propelled being driven by its 440 volt motor. It is equipped with several 6" and 8" carbine rock bits and drill stems. The machine has not been used for a year but was operating satisfactorily at the time it was replaced with a new rotary drill. The bit dresser needs some repair work. The equipment was purchased new in 1946 at a cost of $11,600. We wish to sell this machine and are letting it go for the best bid over $2,800. Plus any applicable taxes, on an as is, where is, basis. Located in the State of Washington.

EXCAVATING ENGINEER
Box 3759 **South Milwaukee, Wis.**

TWO GANTRY CRANES

302'
Electrically powered, 440 volt
Transverse, horizontal and vertical travel
6-ton hook load capacity at 302' span; capacity can be increased for 25 ton hook load by shortening span with few modifications.
Storage hopper capacity 21 cu. yds. Single hopper arrangement.
Full load operating capacity 65 cu. yds. per hour.
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Total weight each: ..... 150 tons
Estimated dismantling cost: $15,000
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Price: ..... $100,000 each
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P.O. Box 177 **Bellwood, Ill.**
AUstin 7-4300 **LInden 4-5600**

MISCELLANEOUS EQUIPMENT

BIT FURNACE

Sunbeam—gas fired—three 9" dia. x 13" deep chambers—complete with motor, blower, controls and feed rack with carriages for each opening—new 1956 used very little—excellent condition, cheap—located Evansville, Ind.

Contact J. E. Smart
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SPARE PARTS WANTED

Will purchase any inventory of unused Bucyrus-Erie 22-T, 27-T, 29-T, 42-T and 50-T churn drill spare parts.

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Used engine in good serviceable condition suitable to power B-E 200-W dragline. Engine should be Cooper Bessemer FW6 or equal. Write Box No. 3761.

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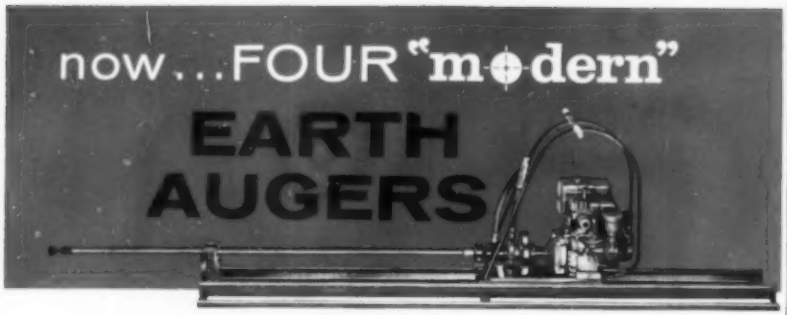

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for accuracy and ease of operation

One man can operate it, averaging 5′ per minute when drilling 2½″ hole and can ream up to 16′. Drills long range laterally (200′ or more). Powered by Briggs & Stratton engine. Accurate, portable, hydro-dynamic dirt flush action.

3 H.P. $430.00 f.o.b. Exeter, Nebr.

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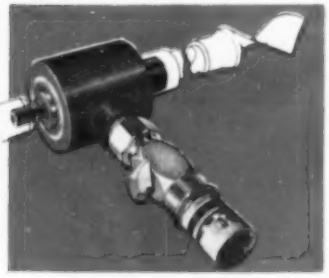
"MODERN" Earth Auger—either track-mounted or hand-held model, drills under shrubbery, lawns, walks, terraces, streets, railroads, highways without damage to property or disrupting traffic. Water pressure flushes out dirt loosened by the auger; return auger bits will enlarge hole to desired size on return drilling.



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Hydrodynamic dirt flush; first job pays for itself, 4″ and up dia. return augers; extension shafts 5′ length, ¾″ dia. available; use any length pipe.

Complete with 2″ pilot auger with ½″ or ⅝″ drive shank. $49.95

Contact your wholesaler or write:

Modern Products, Inc.

P.O. Box 344, Dept. EE, Exeter, Nebraska

NEW Trade Literature

Subject: **Koehring Excavators**

Content: Koehring's mailer, *Make More Dollars Move*, features the ¾-yd. 305 and 1-yd. 405 crawler machines. It shows, through 10 on-the-job photographs and appropriate descriptive copy, how these models perform well on pipeline, road, building and quarry work. Hoe, shovel, clam, dragline and crane front ends are illustrated.

Where to get: Koehring Division, Koehring Co., Department EE, 3026 W. Concordia Ave., Milwaukee 16, Wis.

Subject: **Brake Linings**

Content: An 80-page catalog lists braking and other friction materials for power shovels, hoists, graders, take-off units, dozers and farm tractors. Organic and sintered metallic materials are included for every type of clutch and brake application. An index of manufacturers helps to locate proper specifications for parts on equipment of all makes. There is a cross index of brake lining size. A glossary of equipment technical terms and ordering information make the catalog a valuable reference work for maintenance departments.

Where to get: American Brake Shoe Co., Department EE, 530 Fifth Ave., New York 36, N. Y.

Subject: **30-Ton Dumper**

Content: Aveling-Barford's 30-ton payload dumper is described in a 2-page bulletin. The bulletin illustrates the truck's features and lists complete specifications. Powered by a 400-hp Rolls-Royce C8TFL engine, the dumper has a 20-yd. capacity. Ask for bulletin No. 1852.

Where to get: Aveling-Barford, Ltd., Department EE, Grantham, England.

Subject: **Portable Hydraulic Dredges**

Content: A 16-page bulletin shows Ellicott's "Dragon" model dredges in operation on a variety of projects throughout the world. Portability, size, and recent factors in the engineering and design of the dredges are explained. Economy is discussed, particularly in connection with the dredge's ability to excavate, convey and redeposit waterbound solids in one operation. Ask for bulletin 980.

Where to get: Ellicott Machine Corp., Department EE, 1611 Bush St., Baltimore, Md.

This 21000-powered Bucyrus-Erie dragline is swinging a 3-yd bucket on a stripping operation south of Seagoville, Texas.

H. GLENN BUTLER

CLARK FINDLEY

"20% more production on 40% less fuel with our Allis-Chalmers 21000 diesel"

. . . says Butler-Findley Co.

Repowering a Bucyrus-Erie 54-B dragline with an Allis-Chalmers 21000 diesel boosted stripping operations 20 percent for Butler-Findley Co., Dallas, according to Clark Findley, superintendent and production manager. "This engine has given a good old machine new life and stamina," said Mr. Findley.

H. Glenn Butler adds, "Not only that, we are realizing fuel savings of over 40 percent! The 21000 uses less than 5 gal. per hour compared with over 8 gal. for engines in our other machines of the same capacity. We get more work done with much less operation expense, which means dollars to us."

If you want to boost production and save money doing it, talk to your dealer about powering with a modern Allis-Chalmers diesel. Allis-Chalmers, Milwaukee 1, Wisconsin. BC-35

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This picture demonstrates how friction-free the Bucyrus-Erie 14-B ball-bearing swing circle is. One man swings the entire machine easily by pushing on the hoe boom. What's more, the 14-B's swing circle is adjusted, lubricated and sealed at the factory — requires little additional maintenance.

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The easy-swinging, ball-bearing swing circle is just one way we've thought about your needs. Ask your distributor for all the facts on the 14-B — the biggest crane-excavator you can buy for the money.

44E60